

**THERMAL DISPERSION MODELING FOR
NON-CONTACT COOLING WATER DISCHARGES FROM
THE BURGER FIELD LOCATED IN THE CHUKCHI SEA**

Prepared for:

Shell Alaska Venture
Anchorage, AK 99503

Prepared by:



3 Elm Street, Suite 2
Maynard, MA 01754
www.fluid-dynamix.com

February 8, 2013

Copyright 2013 by Fluid Dynamix. Company Confidential.

EXECUTIVE SUMMARY

The primary goal of this environmental numeric modeling was to simulate non-contact cooling water Discharges from the drilling operations conducted in the Burger Field, located in the Chuckchi Sea, by SHELL Alaska Venture.

Numeric simulations for the thermal dispersion were conducted using the **US EPA Visual Plumes Model** to characterize the non-contact cooling water point discharges from the drilling operations conducted in the Burger Field by the drill rig **Noble Discoverer**. The numeric simulations were conducted for seven point discharge sources from the drill rig Noble Discoverer.

The thermal dispersion simulations were performed using the ambient data for the planned drilling period. The planned drilling period is within the open water season of July thru October. The direction of the discharge was assumed to be aligned with the ambient flow direction for the modeling purpose since the current bends the plume in the direction of flow (Frick 2003). The potential impact matrix on the ambient water quality based on the US EPA Visual Plumes thermal dispersion numeric simulations presents the following estimates: maximum plume depth is 3.0 m; maximum plume width is 15.0 m; maximum distance from the source is 250.0 m; maximum duration is 30.0 minutes; and maximum area affected is 45.0 square meters. These estimates indicate no significant impact on the ambient water quality.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	I
TABLE OF FIGURES	III
TABLE OF TABLES	V
SECTION 1: INTRODUCTION	1
SECTION 2: THERMAL DISPERSION MODELING	4
SECTION 3: THERMAL DISPERSION MODELING - HOUSE A/C AND REFRIGERATION UNITS	5
SECTION 4: THERMAL DISPERSION MODELING - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE	10
SECTION 5: THERMAL DISPERSION MODELING - CAT GENERATORS I	15
SECTION 6: THERMAL DISPERSION MODELING - CAT GENERATORS II	20
SECTION 7: THERMAL DISPERSION MODELING - EVAPORATOR UNITS.....	25
SECTION 8: THERMAL DISPERSION MODELING - SCR ROOM AC	30
SECTION 9: THERMAL DISPERSION MODELING - CEMENT UNIT	35
SECTION 10: SUMMARY AND CONCLUSION	40
SECTION 11: REFERENCES	41
APPENDICES	
APPENDIX A: GENERAL MODEL INPUT DATA	43
APPENDIX B: HOUSE A/C AND REFRIGERATION UNITS	50
APPENDIX C: HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE	61
APPENDIX D: CAT GENERATORS I	71
APPENDIX E: CAT GENERATORS II	78
APPENDIX F: EVAPORATOR UNITS	85
APPENDIX G: SCR ROOM AC	93
APPENDIX H: CEMENT UNIT	103

TABLE OF FIGURES

FIGURE 1-1 LOCATION OF THE BURGER FIELD	1
FIGURE 3-1 AMBIENT AND PLUME PROPERTIES - HOUSE A/C AND REFRIGERATION UNITS	5
FIGURE 3-2 PLUME PATH - HOUSE A/C AND REFRIGERATION UNITS	6
FIGURE 3-3 PLUME TRAJECTORY - HOUSE A/C AND REFRIGERATION UNITS	7
FIGURE 3-4 PLUME DILUTION - HOUSE A/C AND REFRIGERATION UNITS	7
FIGURE 3-5 PLUME TEMPERATURE DECAY - HOUSE A/C AND REFRIGERATION UNITS	8
FIGURE 3-6 DURATION OF EXCESS TEMPERATURE - HOUSE A/C AND REFRIGERATION UNITS	8
FIGURE 3-7 AREA AFFECTED BY EXCESS TEMPERATURE - HOUSE A/C AND REFRIGERATION UNITS	9
FIGURE 4-1 AMBIENT AND PLUME PROPERTIES - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE	10
FIGURE 4-2 PLUME PATH - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE	11
FIGURE 4-3 PLUME TRAJECTORY - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE	12
FIGURE 4-4 PLUME DILUTION - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE	12
FIGURE 4-5 PLUME TEMPERATURE DECAY - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE	13
FIGURE 4-6 DURATION OF EXCESS TEMPERATURE - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE....	13
FIGURE 4-7 AREA AFFECTED BY EXCESS TEMPERATURE - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE	14
FIGURE 5-1 AMBIENT AND PLUME PROPERTIES – CAT GENERATORS I	15
FIGURE 5-2 PLUME PATH - CAT GENERATORS I	16
FIGURE 5-3 PLUME TRAJECTORY - CAT GENERATORS I	17
FIGURE 5-4 PLUME DILUTION - CAT GENERATORS I	17
FIGURE 5-5 PLUME TEMPERATURE DECAY - CAT GENERATORS I	18
FIGURE 5-6 DURATION OF EXCESS TEMPERATURE - CAT GENERATORS I	18
FIGURE 5-7 AREA AFFECTED BY EXCESS TEMPERATURE - CAT GENERATORS I	19
FIGURE 6-1 AMBIENT AND PLUME PROPERTIES - CAT GENERATORS II	20
FIGURE 6-2 PLUME PATH - CAT GENERATORS II	21
FIGURE 6-3 PLUME TRAJECTORY - CAT GENERATORS II	22
FIGURE 6-4 PLUME DILUTION - CAT GENERATORS II	22
FIGURE 6-5 PLUME TEMPERATURE DECAY - CAT GENERATORS II	23
FIGURE 6-6 DURATION OF EXCESS TEMPERATURE - CAT GENERATORS II	23
FIGURE 6-7 AREA AFFECTED BY EXCESS TEMPERATURE - CAT GENERATORS II	24

FIGURE 7-1 AMBIENT AND PLUME PROPERTIES - EVAPORATOR UNITS	25
FIGURE 7-2 PLUME PATH - EVAPORATOR UNITS	26
FIGURE 7-3 PLUME TRAJECTORY - EVAPORATOR UNITS	27
FIGURE 7-4 PLUME DILUTION - EVAPORATOR UNITS	27
FIGURE 7-5 PLUME TEMPERATURE DECAY - EVAPORATOR UNITS	28
FIGURE 7-6 DURATION OF EXCESS TEMPERATURE - EVAPORATOR UNITS	28
FIGURE 7-7 AREA AFFECTED BY EXCESS TEMPERATURE - EVAPORATOR UNITS	29
FIGURE 8-1 AMBIENT AND PLUME PROPERTIES - SCR Room AC	30
FIGURE 8-2 PLUME PATH - SCR Room AC	31
FIGURE 8-3 PLUME TRAJECTORY - SCR Room AC	32
FIGURE 8-4 PLUME DILUTION - SCR Room AC	32
FIGURE 8-5 PLUME TEMPERATURE DECAY - SCR Room AC	33
FIGURE 8-6 DURATION OF EXCESS TEMPERATURE - SCR Room AC	33
FIGURE 8-7 AREA AFFECTED BY EXCESS TEMPERATURE - SCR Room AC	34
FIGURE 9-1 AMBIENT AND PLUME PROPERTIES - CEMENT UNIT	35
FIGURE 9-2 PLUME PATH - CEMENT UNIT	36
FIGURE 9-3 PLUME TRAJECTORY - CEMENT UNIT	37
FIGURE 9-4 PLUME DILUTION - CEMENT UNIT	37
FIGURE 9-5 PLUME TEMPERATURE DECAY - CEMENT UNIT	38
FIGURE 9-6 DURATION OF EXCESS TEMPERATURE - CEMENT UNIT	38
FIGURE 9-7 AREA AFFECTED BY EXCESS TEMPERATURE - CEMENT UNIT	39

TABLE OF TABLES

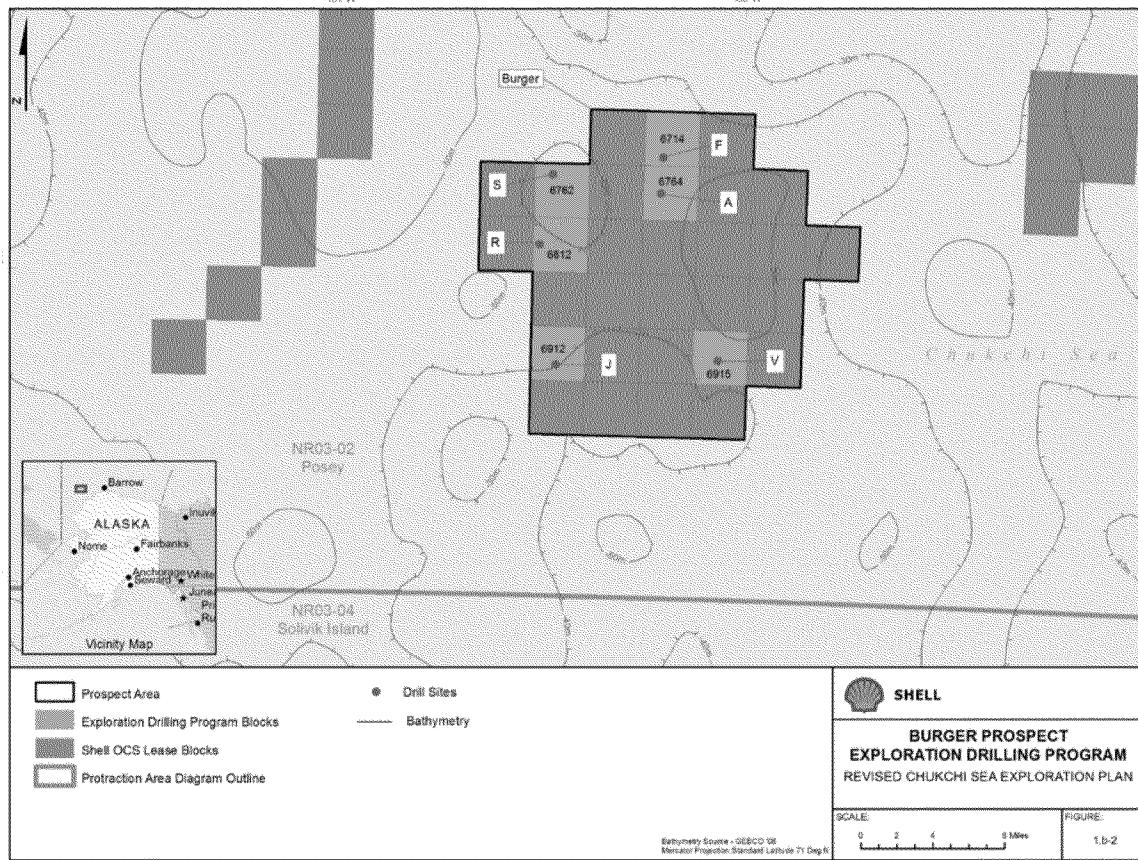
TABLE 1: POINT DISCHARGE LOCATIONS FOR NON-CONTACT COOLING WATER	2
TABLE 2: AMBIENT DATA FOR THE BURGER FIELD IN THE CHUKCHI SEA	3
TABLE 3: SUMMARY AND CONCLUSION	40

Copyright 2013 by Fluid Dynamix. Company Confidential.

SECTION 1: INTRODUCTION

Numeric simulations for the thermal dispersion were conducted using the **US EPA Visual Plumes Model** to characterize the non-contact cooling water point discharges from the drilling operations conducted in the Burger Field by the drill rig Noble Discoverer. The location of the Burger Field in the Chukchi Sea is presented in **Figure 1**. The numeric simulations were conducted for the seven point discharge locations from the drill rig Noble Discoverer Starboard as listed in **Table 1**.

FIGURE 1-1
LOCATION OF THE BURGER FIELD



Visual Plumes Model

Visual Plumes is a mixing zone model developed by the US EPA's Ecosystems Research Division, National Exposure Research Laboratory (Frick 2003). **PDS** module of the VP Plumes model was used for numeric simulations of the thermal dispersion for all point discharges listed in Table 1. PDS is a three-dimensional plume model that applies to point discharges to water bodies. PDS module provides simulations for temperature and dilution over a wide range of discharge conditions. PDS is an Eulerian integral flux model for the surface discharge into a moving ambient body of water that includes the effects of surface heat transfer. The initial discharge momentum causes the plume to penetrate the ambient at the same time that the current bends the plume in the direction of flow (Frick 2003).

Copyright 2013 by Fluid Dynamix. Company Confidential.

TABLE 1: POINT DISCHARGE LOCATIONS FOR NON-CONTACT COOLING WATER

Discharge Type	Discharge Number	Discharge Description	Location	Volume Discharged (bbls/day)	Discharge Duration (hours/day)	Internal Diameter (inches)	Effluent Temp (°C)	Effluent Salinity (psu)
Non-Contact Cooling Water	009	House A/C and Refrigeration Units	Starboard /Aft	4,165	24	6.09	5.1	31
		Hydraulic Unit, Compressor Chiller & Rig Brake	Port/Mid	4,760	24	4.03	4.2	31
		CAT Generators I	Starboard /Bow	610	24	6.09	16.1	31
		CAT Generators II	Port/Bow	610	24	6.09	16.1	31
		Evaporator Units	Starboard /Port	2,200	24	6.09	14.0	31
		SCR Room A/C	Starboard /Mid	70	24	4.03	4.2	31
		Cement Unit	Starboard /Mid	1,115	24	4.03	12.0	31

Effluent Data

The estimated volumes of non-contact cooling water to be discharged from the different discharge locations vary from a low of 70 barrels per day (bbls/day) to a high of 4,760 bbls/day, as shown in Table 1. The durations of discharge are 24 hours per day. The temperatures of the effluents to be discharged from the different discharge locations also vary from a low of 4.2 degrees Celsius (°C) to a high of 16.1 °C as presented in Table 1. The salinities for all the effluents are 31 Practical Salinity Scale Unit (psu). The discharge pipe diameters vary from 4.03 inches to 6.09 inches. All effluent discharges occur at or near the sea surface.

Ambient Data

The ambient water depth within the Burger Field location in the Chukchi Sea varies from 43.9 meters (m) to 45.7 m as presented in **Table 2**. The current speed is approximately 7 centimeter per second (cm/sec) with a prevailing direction of flow to the east for the planned drilling period. The temperature of the ambient water varies from 4 °C at the surface stratum to - 0.5 °C at the bottom stratum, with a significant stratification occurring at 15 m depth. The salinity of the ambient water varies from 30 psu at the surface stratum to 32 psu at the bottom stratum, with a significant stratification occurring at 15 m depth.

TABLE 2: AMBIENT DATA FOR THE BURGER FIELD IN THE CHUKCHI SEA

Water depth m	Temp °C	Salinity psu	Current	
			Speed (cm/s)	Direction
0	4	30	7	to the East
43.9 - 45.7	- 0.5	32	7	to the East

Copyright 2013 by Fluid Dynamix. Company Confidential.

SECTION 2: THERMAL DISPERSION MODELING

Thermal dispersion numeric simulations were performed for the seven point discharge sources listed below. Each discharge sources were modeled using the **US EPA Visual Plumes** model as described in **Section 1**. The modeling results for each source are described in details in the followings **Sections 3-9**. **Section 10** presents the summary and conclusion for all the point discharge sources listed below. Section 11 lists the references. The general model input parameters are presented in Tabular format in Appendix A. The source specific text version of the model input and output are presented in Appendices B, C, D, E, F, G, and H.

- 1. House A/C and Refrigeration Units**
- 2. Hydraulic Unit, Compressor Chiller, and Rig Brake**
- 3. CAT Generators I**
- 4. CAT Generators II**
- 5. Evaporator Units**
- 6. SCR Room A/C**
- 7. Cement Unit**

SECTION 3: THERMAL DISPERSION MODELING - HOUSE A/C AND REFRIGERATION UNITS

The volume of the non-contact cooling water discharge from *House A/C and Refrigeration Units*, located in the Main Engine Room is **4,165 bbls/day**. The duration of discharge is 24 hours/day. The temperature and salinity of the effluent are **5.1 °C** and **31 psu**, respectively. The discharge occurs from a 6.09-inch diameter pipe at or near the sea surface. The direction of the discharge is assumed to be aligned with the ambient flow direction for the modeling purpose since the current bends the plume in the direction of flow (Frick 2003). The Visual Plumes model results for: ambient and plume properties; plume path; plume trajectory; plume dilution; and plume temperature decay are presented in **Figures 3-1, 3-2, 3-3, 3-4, and 3-5** respectively. **Figures 3-6 and 3-7** present the duration of the excess temperature and the area affected.

FIGURE 3-1

AMBIENT AND PLUME PROPERTIES - HOUSE A/C AND REFRIGERATION UNITS

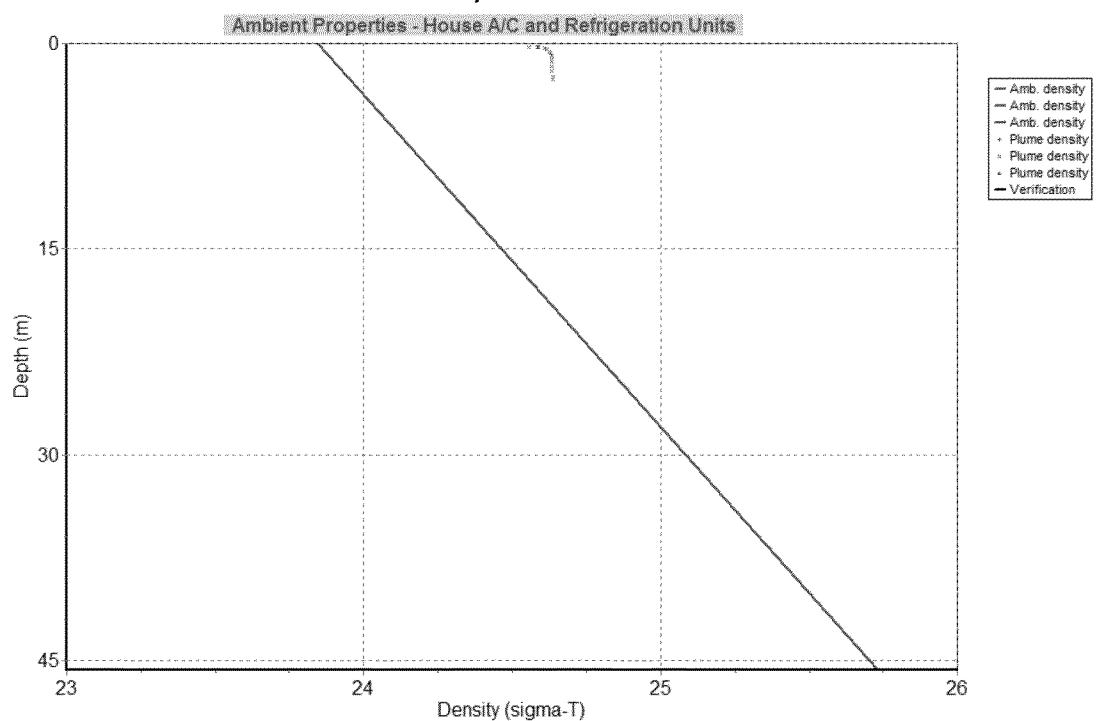


Figure 3-1 presents the ambient and plume densities (σ_T) versus the depth from the sea surface. The ambient density (σ_T) varies from 23.80 kg/m^3 at the surface to 25.77 kg/m^3 at the bottom. As seen above, the thermal plume is released near the sea surface and the initial discharge momentum causes the heavier effluent ($\sigma_T = 24.48 \text{ kg/m}^3$) plume to sink into the ambient to a depth of approximately 2.5 m. **Figure 3-2** presents the width of the plume. The maximum width of the plume is approximately 10 m at a distance of approximately 250 m from the source. The plume trajectory presented in **Figure 3-3** also shows that the plume reaches a depth of 2.5 m at a distance of approximately 250 m from the source and attains an average dilution factor of 400 as seen in **Figure 3-4**. The plume temperature decay presented in **Figure 3-5** shows that it has cooled to within $0.05 \text{ }^\circ\text{C}$ of the ambient temperature ($4 \text{ }^\circ\text{C}$) at a distance of approximately **50 m** from the source point. It takes approximately twenty (20) minutes for the plume to cool to within $0.05 \text{ }^\circ\text{C}$ of the ambient as presented in **Figure 3-6**. The area affected by

Copyright 2013 by Fluid Dynamix. Company Confidential.

excess temperature of 0.05 °C or higher is limited to less than twenty-five (25) square meters as seen in **Figure 3-7**. Based on these findings, the impact of this release of the non-contact cooling water on the ambient is insignificant and limited to an area of less than 25 square meters.

FIGURE 3-2
PLUME PATH - HOUSE A/C AND REFRIGERATION UNITS

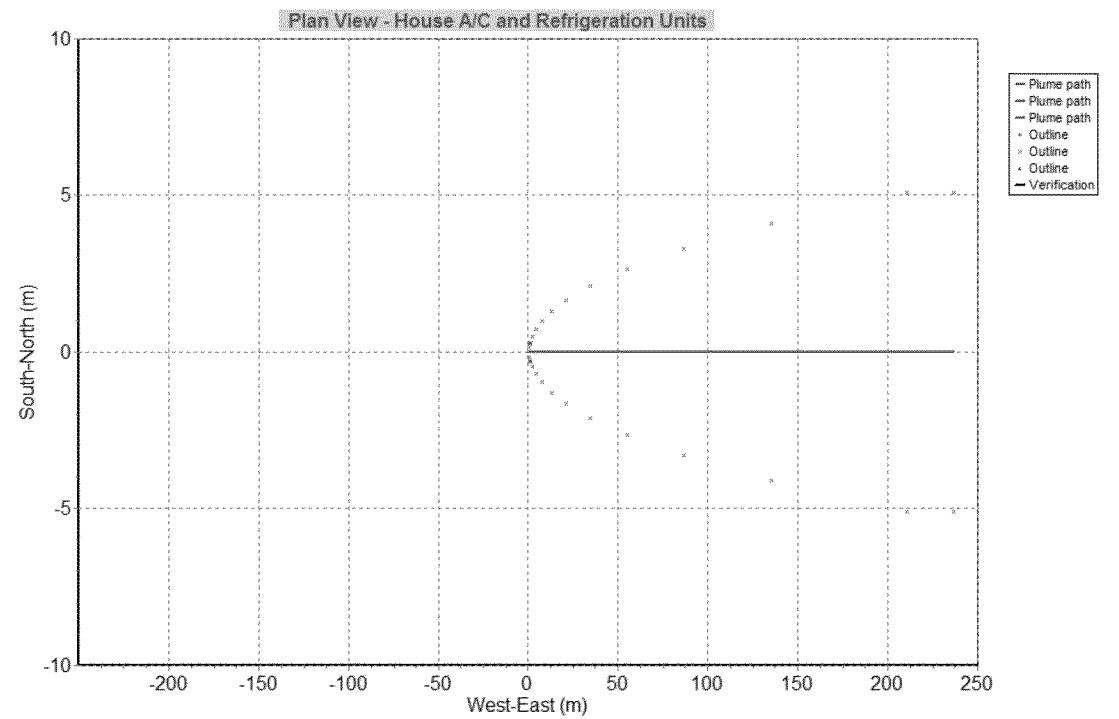
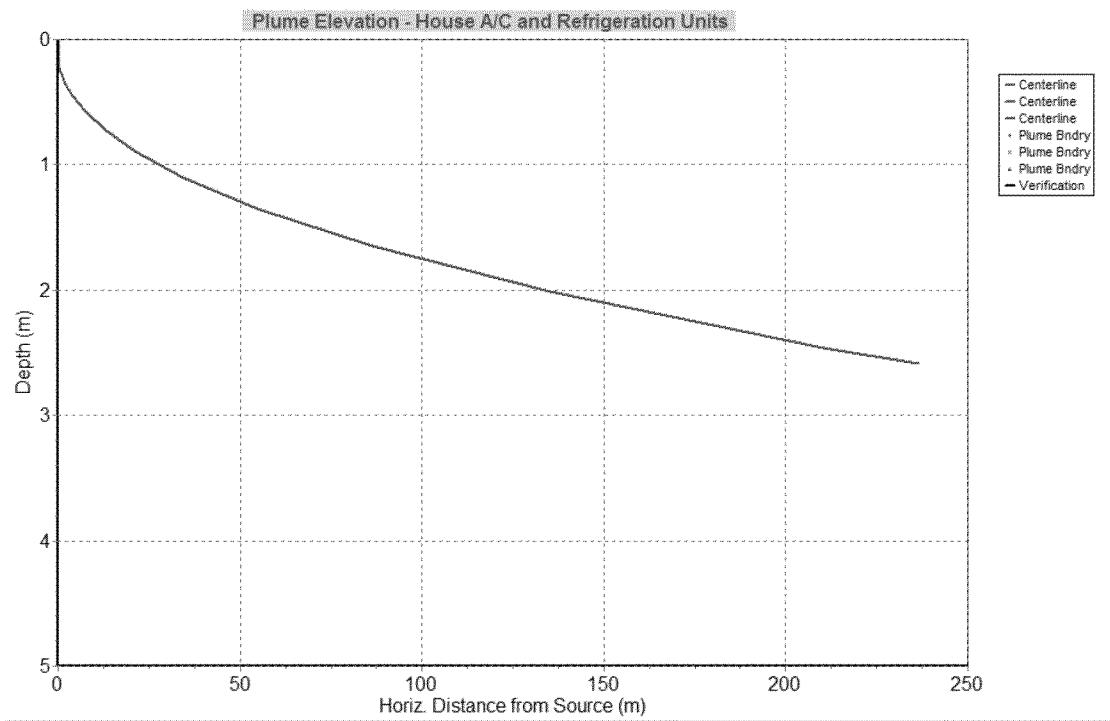
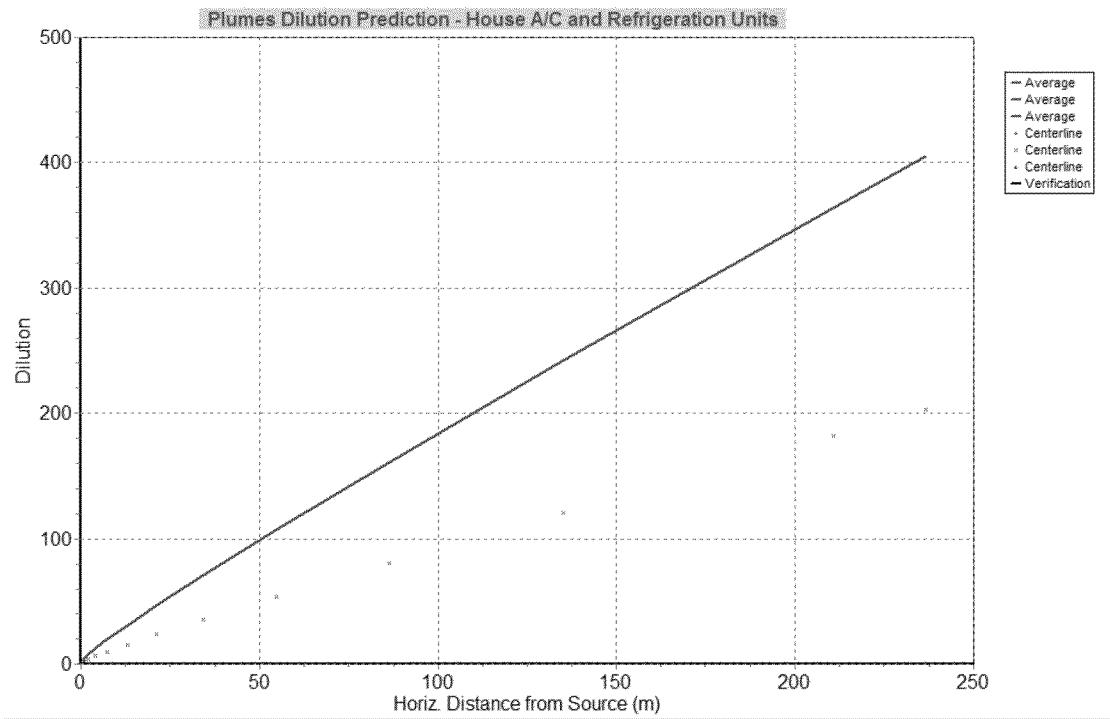


FIGURE 3-3**PLUME TRAJECTORY - HOUSE A/C AND REFRIGERATION UNITS****FIGURE 3-4****PLUME DILUTION - HOUSE A/C AND REFRIGERATION UNITS**

Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 3-5

PLUME TEMPERATURE DECAY - HOUSE A/C AND REFRIGERATION UNITS

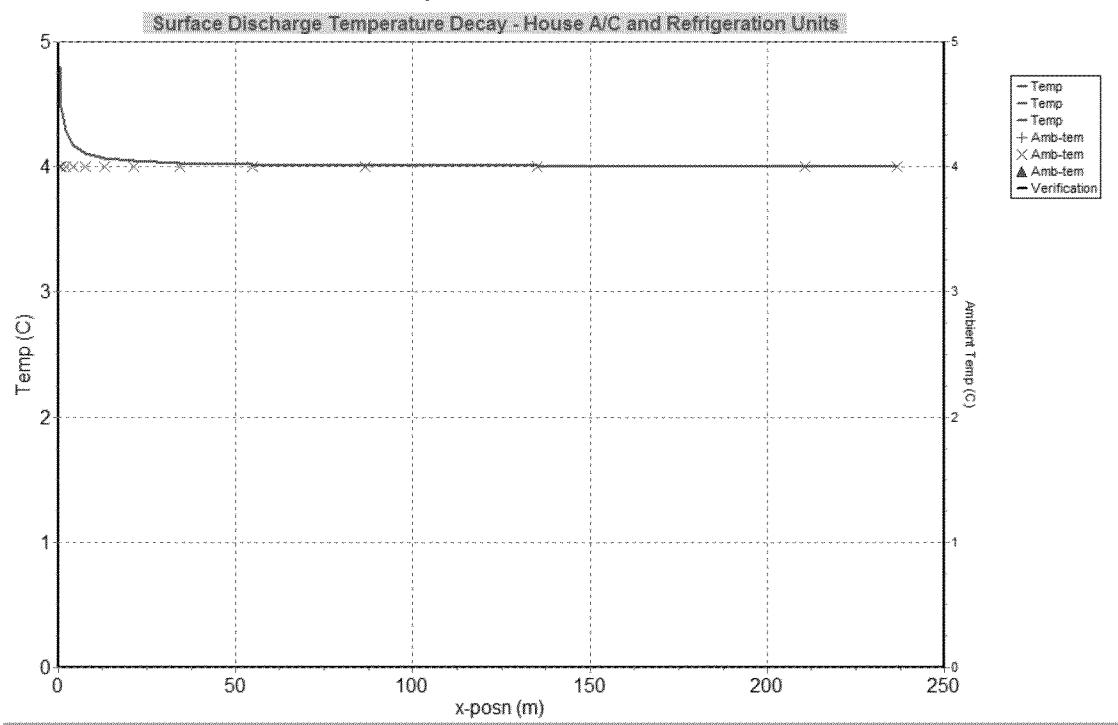
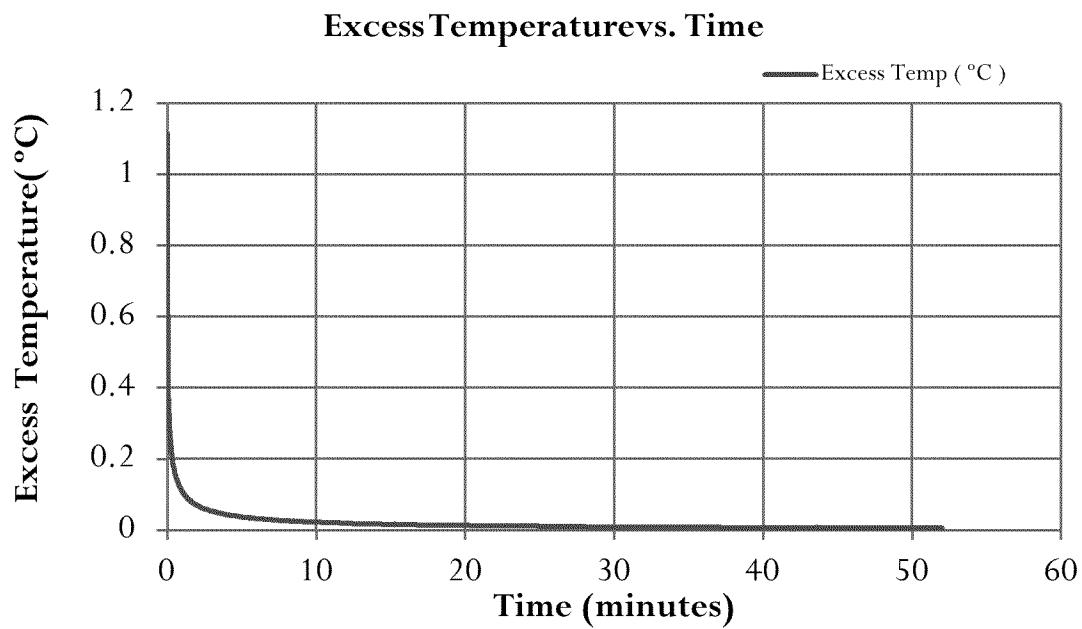


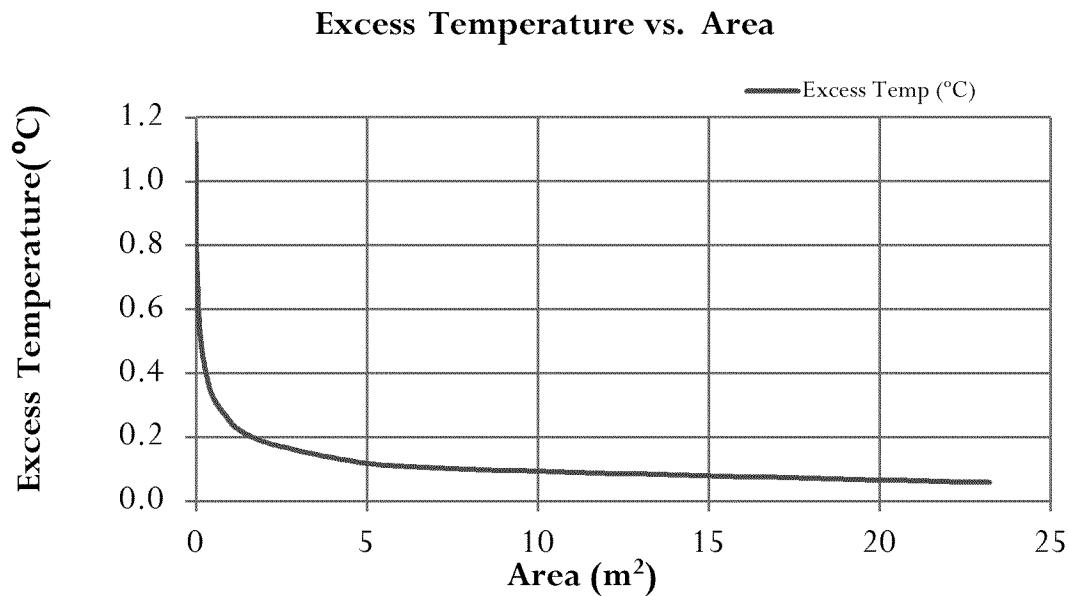
FIGURE 3-6

DURATION OF EXCESS TEMPERATURE - HOUSE A/C AND REFRIGERATION UNITS



Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 3-7
AREA AFFECTED BY EXCESS TEMPERATURE - HOUSE A/C AND REFRIGERATION UNITS



Copyright 2013 by Fluid Dynamix. Company Confidential.

SECTION 4: THERMAL DISPERSION MODELING - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE

The volume of the non-contact cooling water discharge from *Hydraulic Unit, Compressor Chiller & Rig Brake*, located in the MCC Room is **4,760 bbls/day**. The duration of discharge is 24 hours/day. The temperature and salinity of the effluent are **4.2 °C** and **31 psu**, respectively. The discharge occurs from a 4.03-inch diameter pipe at or near the sea surface. The direction of the discharge is assumed to be aligned with the ambient flow direction for the modeling purpose since the current bends the plume in the direction of flow (Frick 2003). The Visual Plumes model results for: ambient and plume properties; plume path; plume trajectory; plume dilution; and plume temperature decay are presented in **Figures 4-1, 4-2, 4-3, 4-4, and 4-5** respectively. **Figures 4-6 and 4-7** present the duration of the excess temperature and the area affected.

FIGURE 4-1

AMBIENT AND PLUME PROPERTIES - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE

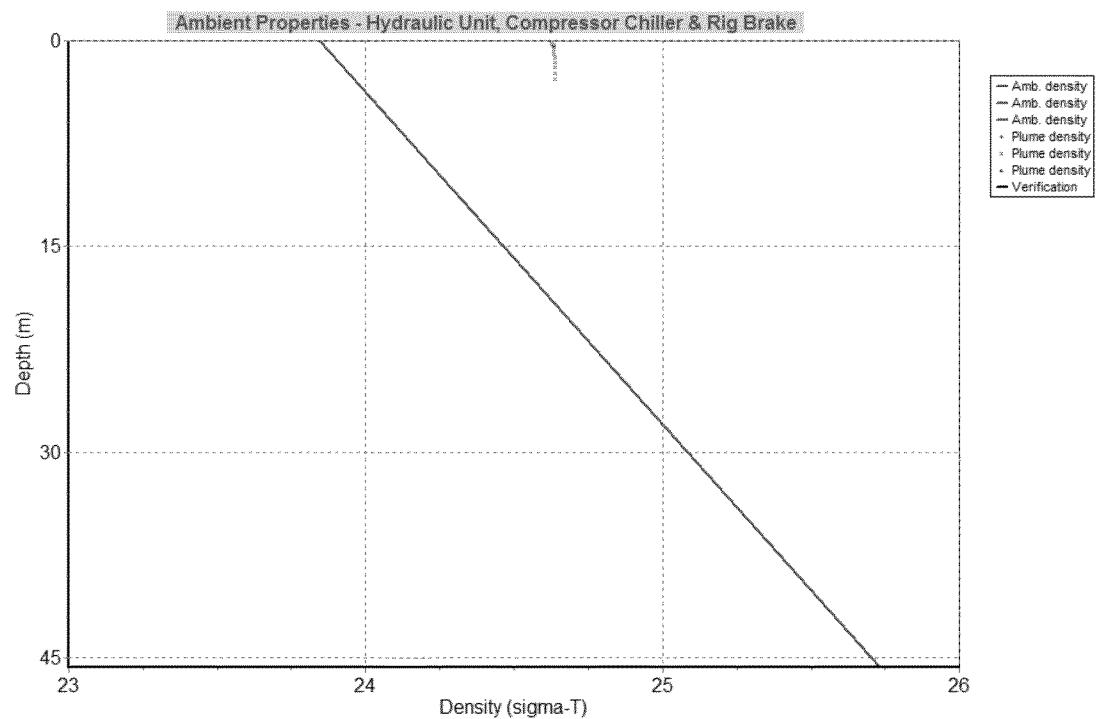


Figure 4-1 presents the ambient and plume densities (σ_T) versus the depth from the sea surface. The ambient density (σ_T) varies from 23.80 kg/m^3 at the surface to 25.77 kg/m^3 at the bottom. As seen above, the thermal plume is released near the sea surface and the initial discharge momentum causes the heavier effluent ($\sigma_T = 24.57 \text{ kg/m}^3$) plume to sink into the ambient to a depth of approximately 3.0 m. **Figure 4-2** presents the width of the plume. The maximum width of the plume is approximately 10 m at a distance of approximately 150 m from the source. The plume trajectory presented in **Figure 4-3** also shows that the plume reaches a depth of approximately 3.0 m at a distance of approximately 150 m from the source and attains an average dilution factor of 400+ as seen in **Figure 4-4**. The plume temperature decay presented in **Figure 4-5** shows that it has cooled to within 0.01°C of the ambient temperature (4°C) at a distance of approximately **10 m** from the source point. It takes approximately

Copyright 2013 by Fluid Dynamix. Company Confidential.

ten (10) minutes for the plume to cool to within 0.01 °C of the ambient as presented in **Figure 4-6**. The total area affected by excess temperature is limited to less than 12.5 square meters as seen in **Figure 4-7**. Based on these findings, the impact of this release of the non-contact cooling water on the ambient is insignificant and limited to an area of less than 12.5 square meters only.

FIGURE 4-2
PLUME PATH - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE

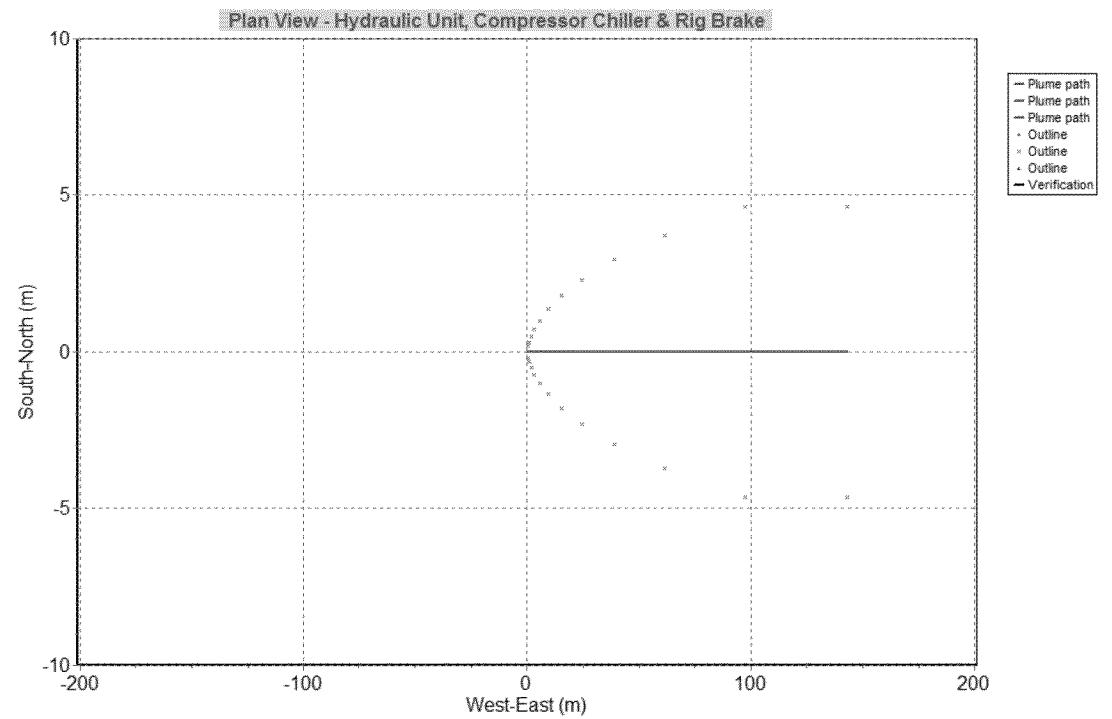
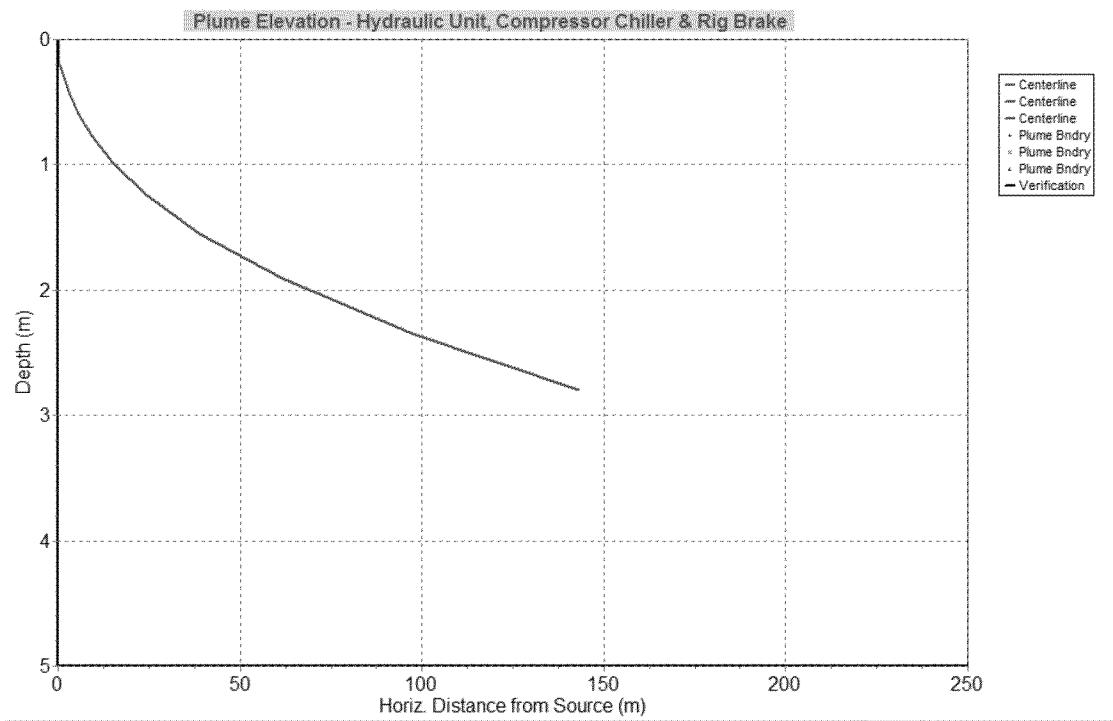
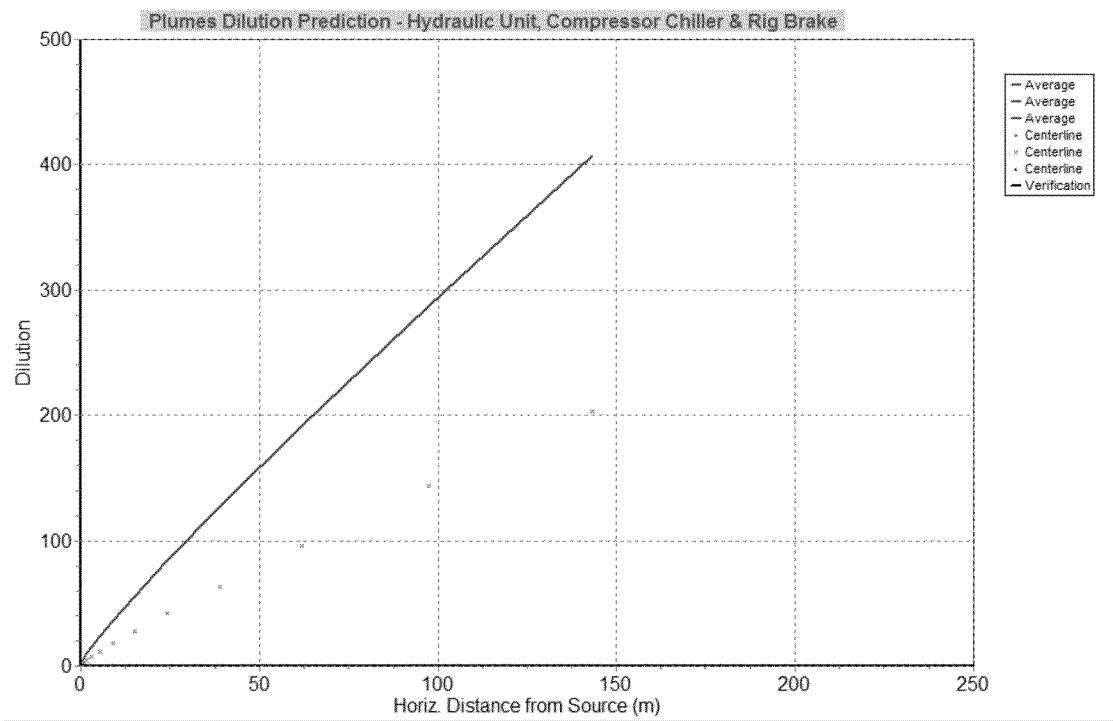
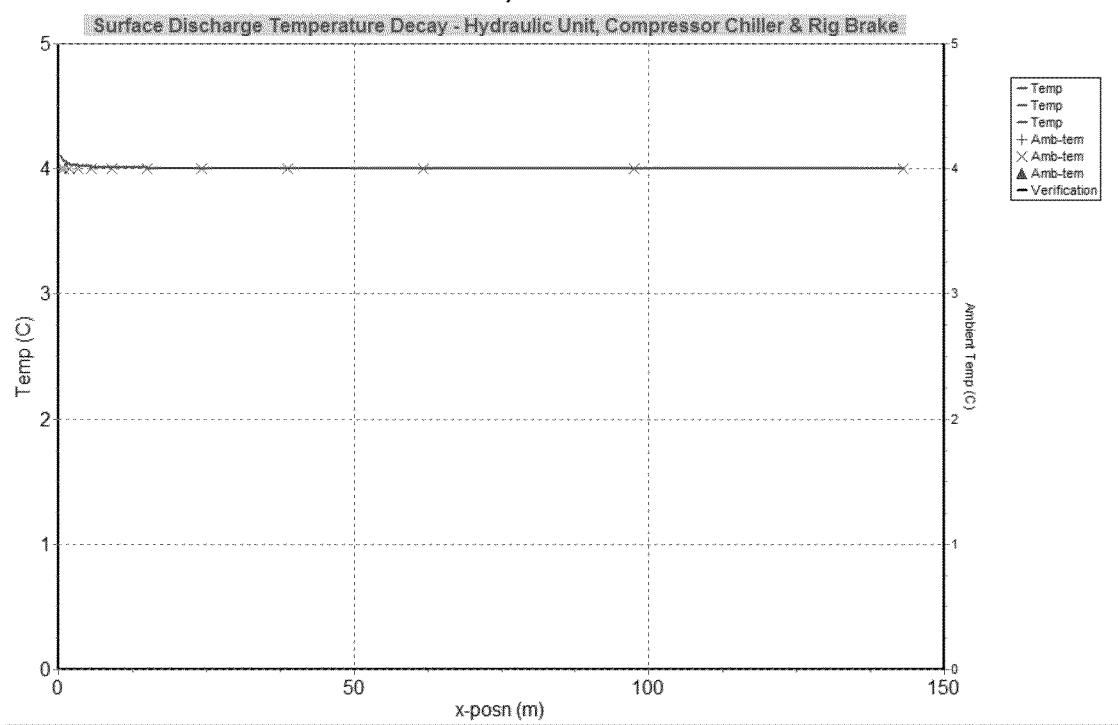
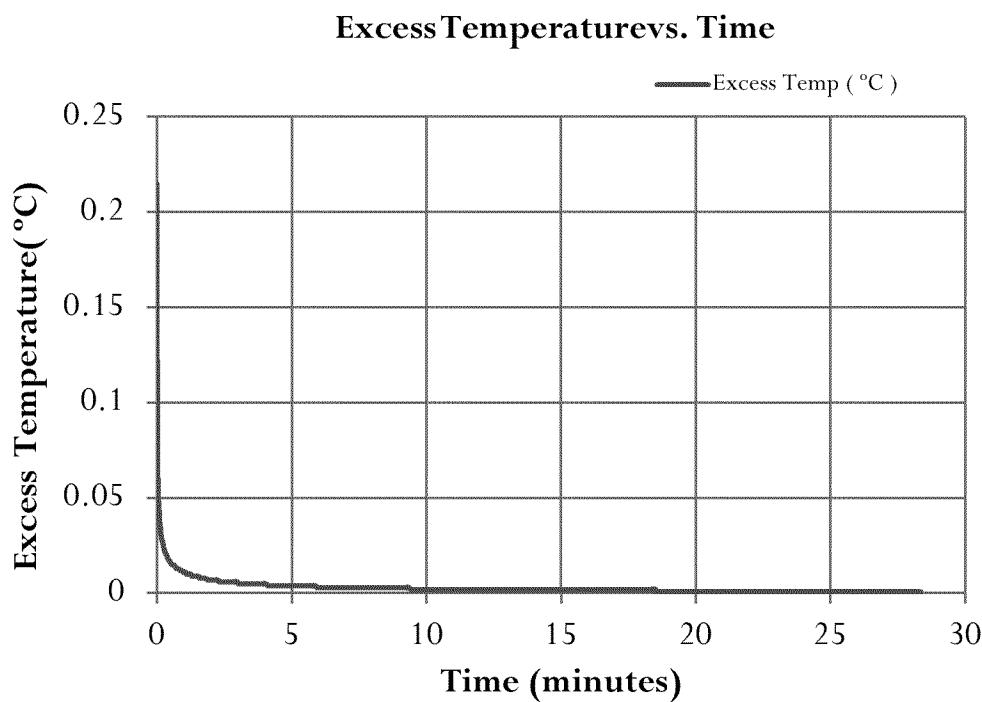


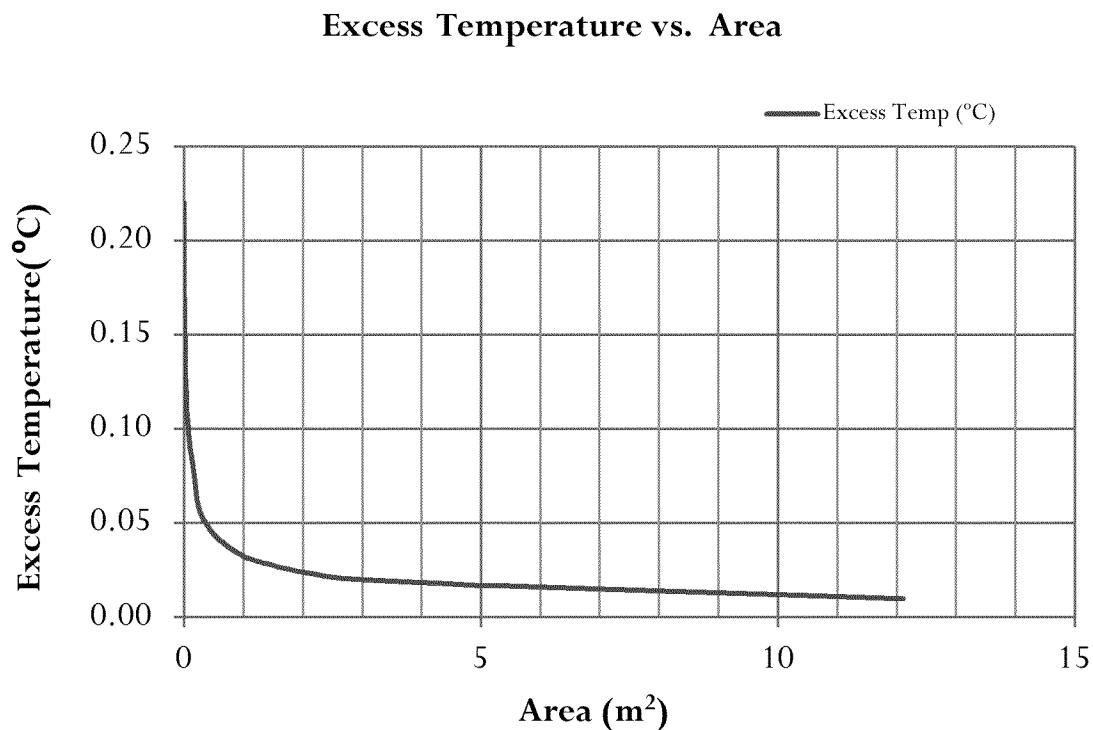
FIGURE 4-3**PLUME TRAJECTORY - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE****FIGURE 4-4****PLUME DILUTION - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE**

Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 4-5**PLUME TEMPERATURE DECAY - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE****FIGURE 4-6****DURATION OF EXCESS TEMPERATURE - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE**

Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 4-7
AREA AFFECTED BY EXCESS TEMPERATURE - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE



Copyright 2013 by Fluid Dynamix. Company Confidential.

SECTION 5: THERMAL DISPERSION MODELING – CAT GENERATORS I

The volume of the non-contact cooling water discharge from *CAT Generators I*, located in Generator Room is **610 bbls/day**. The duration of discharge is 24 hours/day. The temperature and salinity of the effluent are **16.1 °C** and **31 psu**, respectively. The discharge occurs from a 6.09-inch diameter pipe at or near the sea surface. The direction of the discharge is assumed to be aligned with the ambient flow direction for the modeling purpose since the current bends the plume in the direction of flow (Frick 2003). The Visual Plumes model results for: ambient and plume properties; plume path; plume trajectory; plume dilution; and plume temperature decay are presented in **Figures 5-1, 5-2, 5-3, 5-4, and 5-5** respectively. **Figures 5-6 and 5-7** present the duration of the excess temperature and the area affected.

FIGURE 5-1

AMBIENT AND PLUME PROPERTIES - CAT GENERATORS I

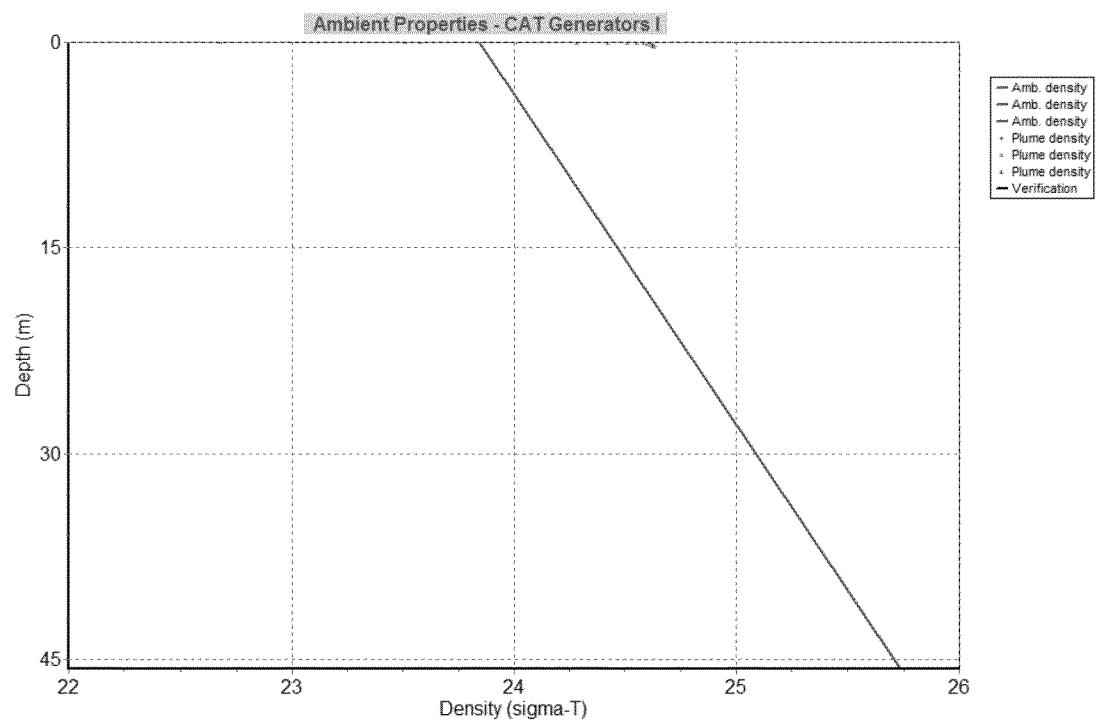


Figure 5-1 presents the ambient and plume densities (σ_T) versus the depth from the sea surface. The ambient density (σ_T) varies from 23.80 kg/m^3 at the surface to 25.77 kg/m^3 at the bottom. As seen above, the thermal plume is released near the sea surface and the initial discharge momentum causes the lighter effluent ($\sigma_T = 22.67 \text{ kg/m}^3$) plume to sink into the ambient only to a depth of approximately 0.5 m. **Figure 5-2** presents the width of the plume. The maximum width of the plume is approximately 10 m at a distance of approximately 110 m from the source. The plume trajectory presented in **Figure 5-3** also shows that the plume reaches a depth of less than 0.5 m at a distance of approximately 110 m from the source and attains an average dilution factor of 400 as seen in **Figure 5-4**. The plume temperature decay presented in **Figure 5-5** shows that it has cooled to within $0.05 \text{ }^\circ\text{C}$ of the ambient temperature ($4 \text{ }^\circ\text{C}$) at a distance of approximately **110 m** from the source point. It takes approximately fifteen (15) minutes for the plume to cool to within $0.05 \text{ }^\circ\text{C}$ of the ambient as presented in **Figure 5-6**.

Copyright 2013 by Fluid Dynamix. Company Confidential.

The area affected by excess temperature of 0.05 °C or higher is limited to less than twenty-five (25) square meters as seen in **Figure 5-7**. Based on these findings, the impact of this release of the non-contact cooling water on the ambient is insignificant and limited to an area of less than 25 square meters.

FIGURE 5-2
PLUME PATH - CAT GENERATORS I

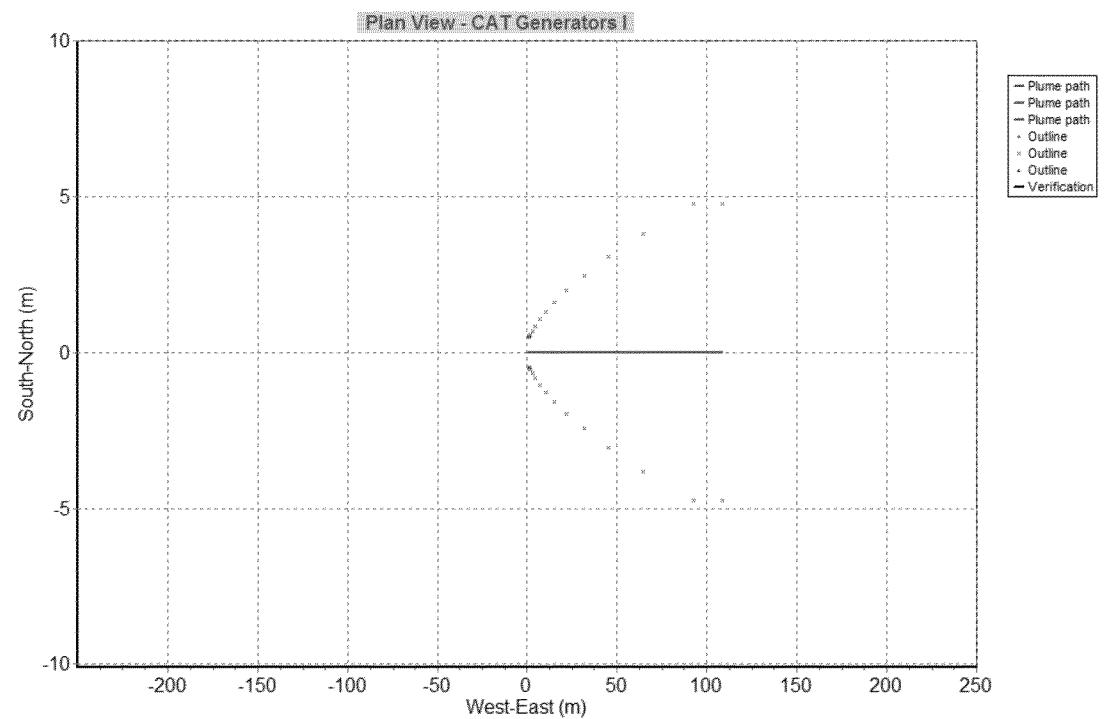


FIGURE 5-3
PLUME TRAJECTORY - CAT GENERATORS I

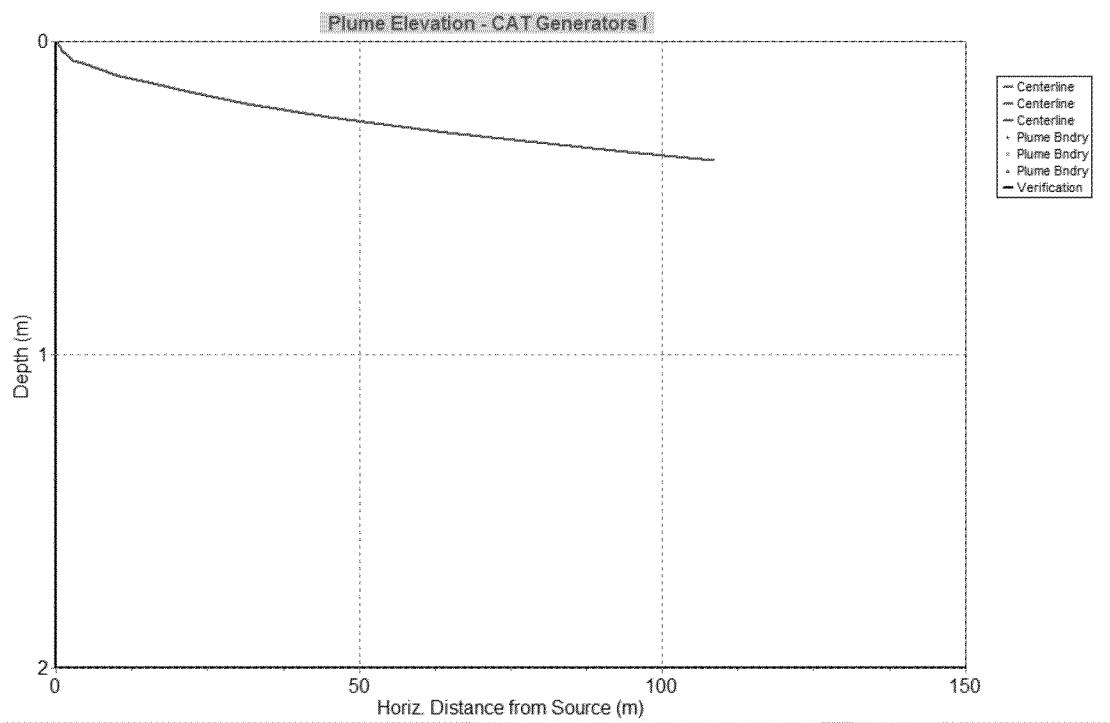
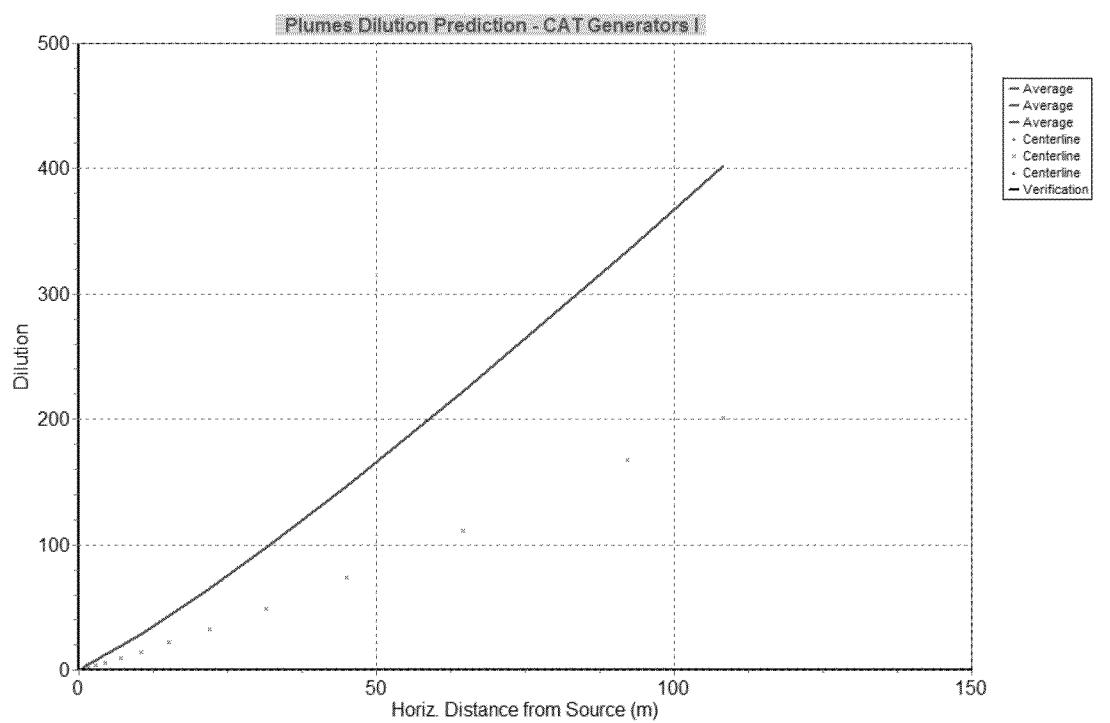


FIGURE 5-4
PLUME DILUTION - CAT GENERATORS I



Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 5-5
PLUME TEMPERATURE DECAY - CAT GENERATORS I

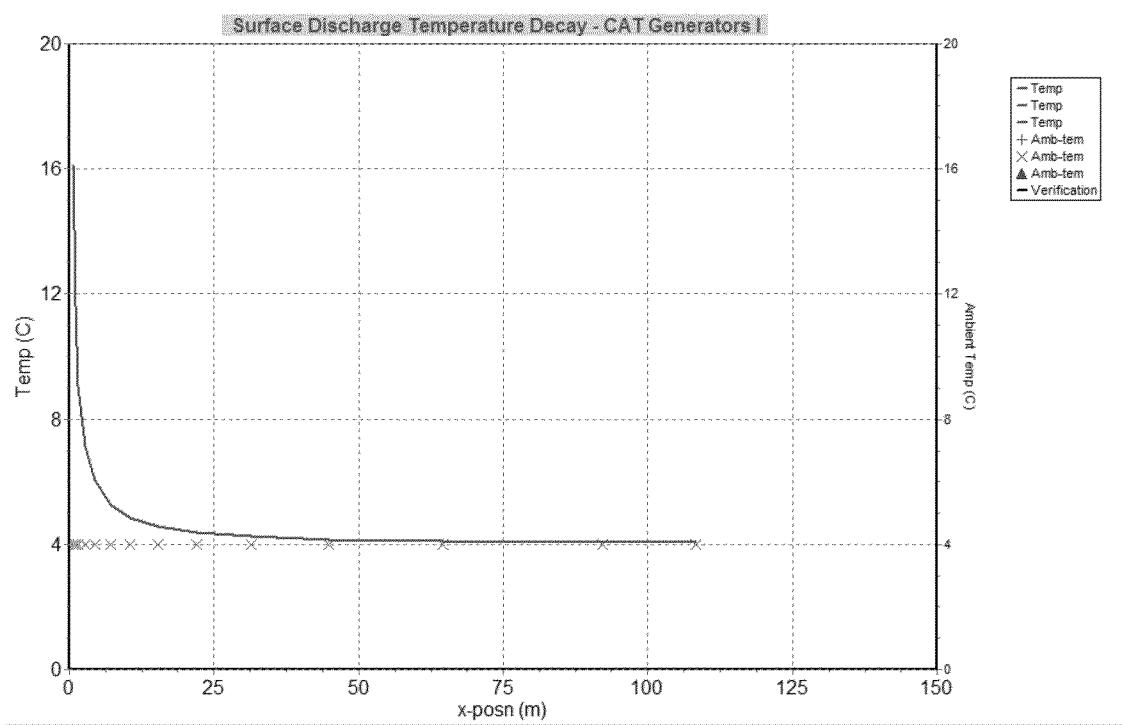
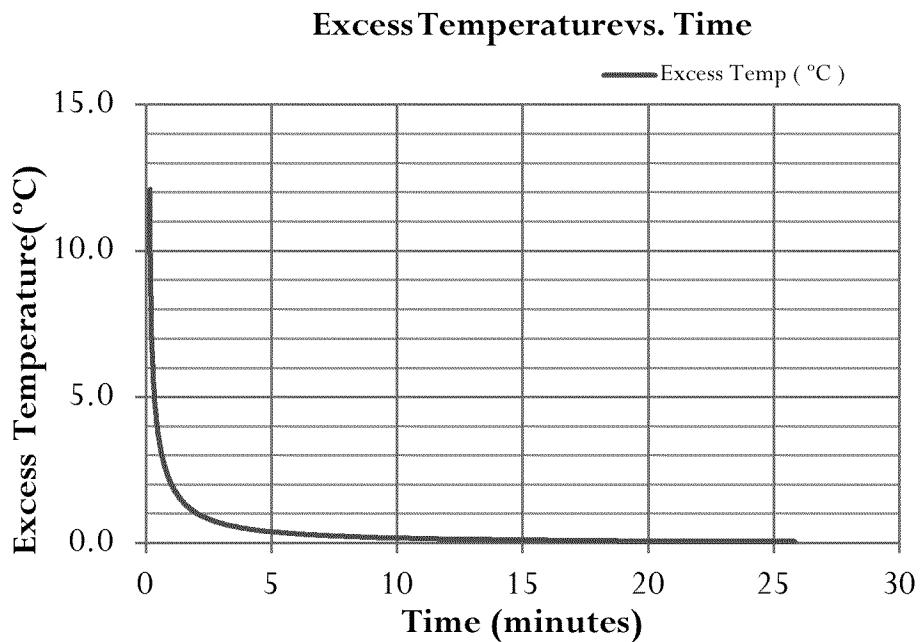
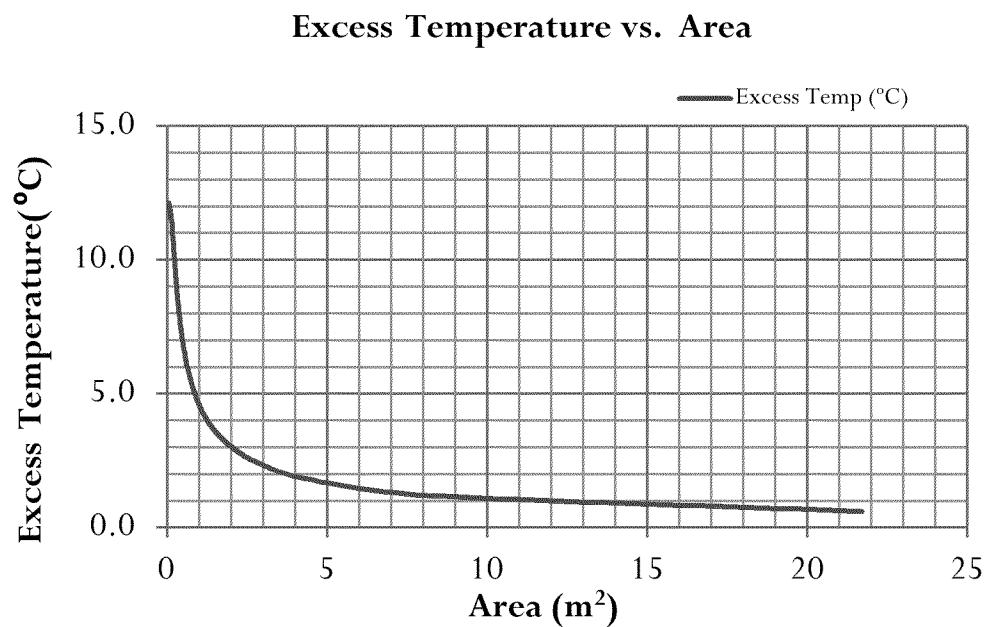


FIGURE 5-6
DURATION OF EXCESS TEMPERATURE - CAT GENERATORS I



Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 5-7
AREA AFFECTED BY EXCESS TEMPERATURE - CAT GENERATORS I



Copyright 2013 by Fluid Dynamix. Company Confidential.

SECTION 6: THERMAL DISPERSION MODELING – CAT GENERATORS II

The volume of the non-contact cooling water discharge from *CAT Generators II*, located in Generator Room is **610 bbls/day**. The duration of discharge is 24 hours/day. The temperature and salinity of the effluent are **16.1 °C** and **31 psu**, respectively. The discharge occurs from a 6.09-inch diameter pipe at or near the sea surface. The direction of the discharge is assumed to be aligned with the ambient flow direction for the modeling purpose since the current bends the plume in the direction of flow (Frick 2003). The Visual Plumes model results for: ambient and plume properties; plume path; plume trajectory; plume dilution; and plume temperature decay are presented in **Figures 6-1, 6-2, 6-3, 6-4, and 6-5** respectively. **Figures 6-6 and 6-7** present the duration of the excess temperature and the area affected.

FIGURE 6-1

AMBIENT AND PLUME PROPERTIES - CAT GENERATORS II

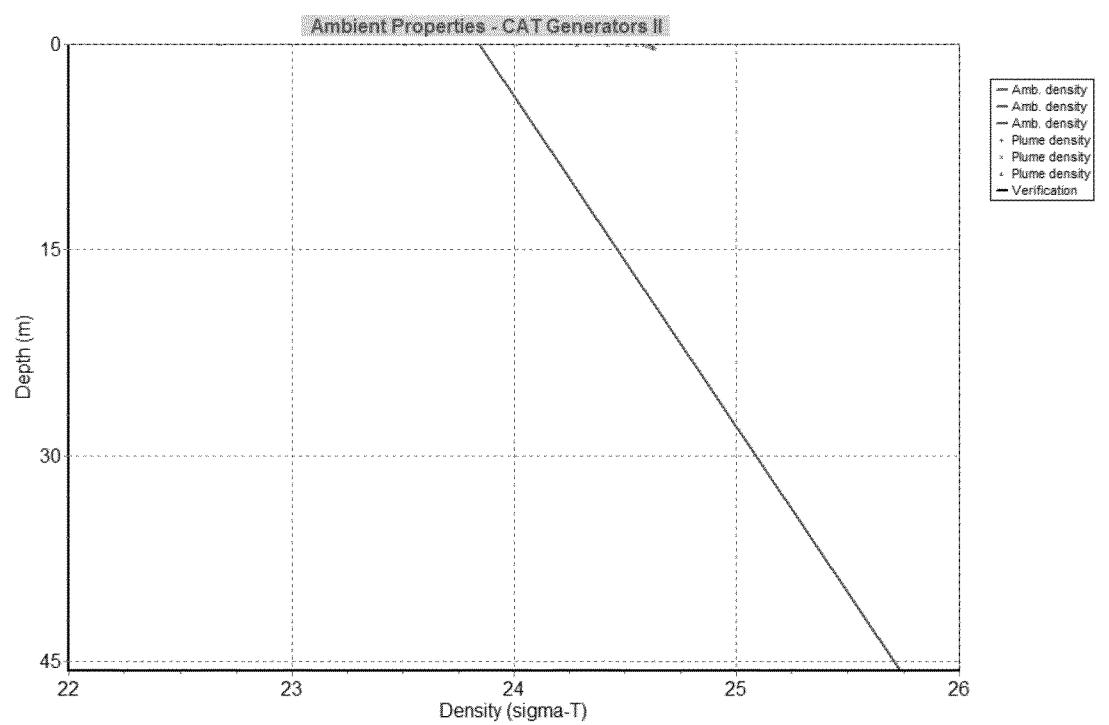


Figure 6-1 presents the ambient and plume densities (σ_T) versus the depth from the sea surface. The ambient density (σ_T) varies from 23.80 kg/m^3 at the surface to 25.77 kg/m^3 at the bottom. As seen above, the thermal plume is released near the sea surface and the initial discharge momentum causes the lighter effluent ($\sigma_T = 22.67 \text{ kg/m}^3$) plume to sink into the ambient only to a depth less than 0.5 m. **Figure 6-2** presents the width of the plume. The maximum width of the plume is approximately 10 m at a distance of approximately **110 m** from the source. The plume trajectory presented in **Figure 6-3** also shows that the plume reaches a depth of less than 0.5 m at a distance of approximately 110 m from the source and attains an average dilution factor of 400 as seen in **Figure 6-4**. The plume temperature decay presented in **Figure 6-5** shows that it has cooled to within 0.05°C of the ambient temperature (4°C) at a distance of approximately **110 m** from the source point. It takes approximately fifteen (15) minutes for the plume to cool to within 0.05°C of the ambient as presented in **Figure 6-6**. The area affected by

excess temperature of 0.05 °C or higher is limited to less than twenty-five (25) square meters as seen in **Figure 6-7**. Based on these findings, the impact of this release of the non-contact cooling water on the ambient is insignificant and limited to an area of less than 25 square meters.

FIGURE 6-2
PLUME PATH - CAT GENERATORS II

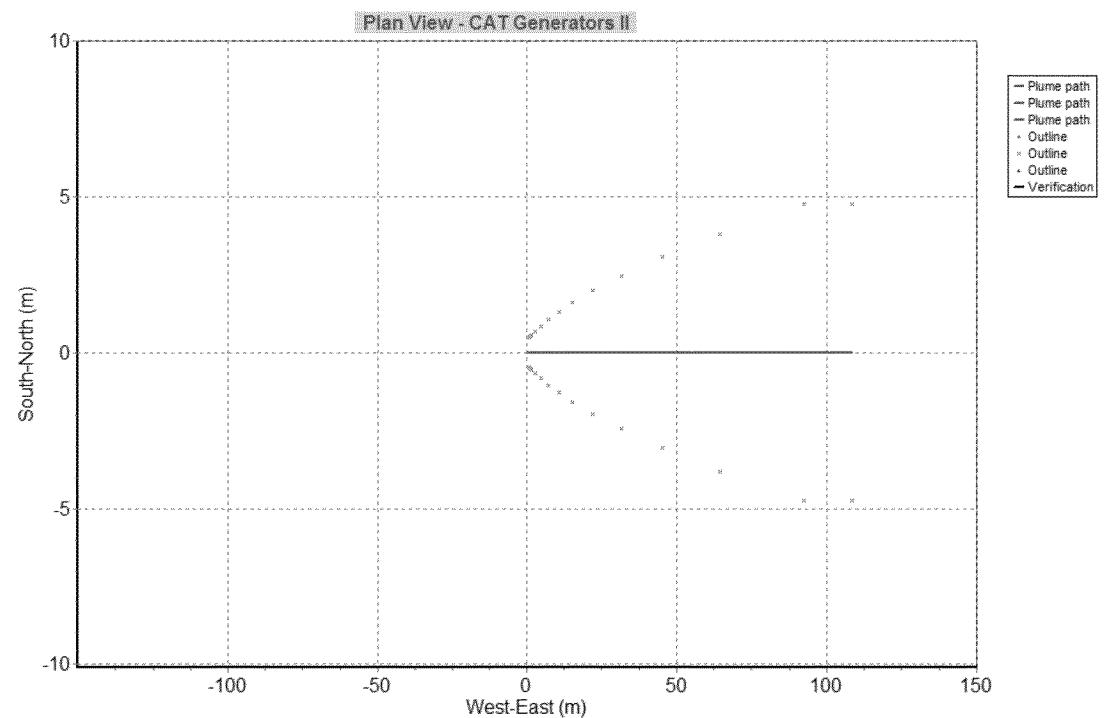


FIGURE 6-3
PLUME TRAJECTORY - CAT GENERATORS II

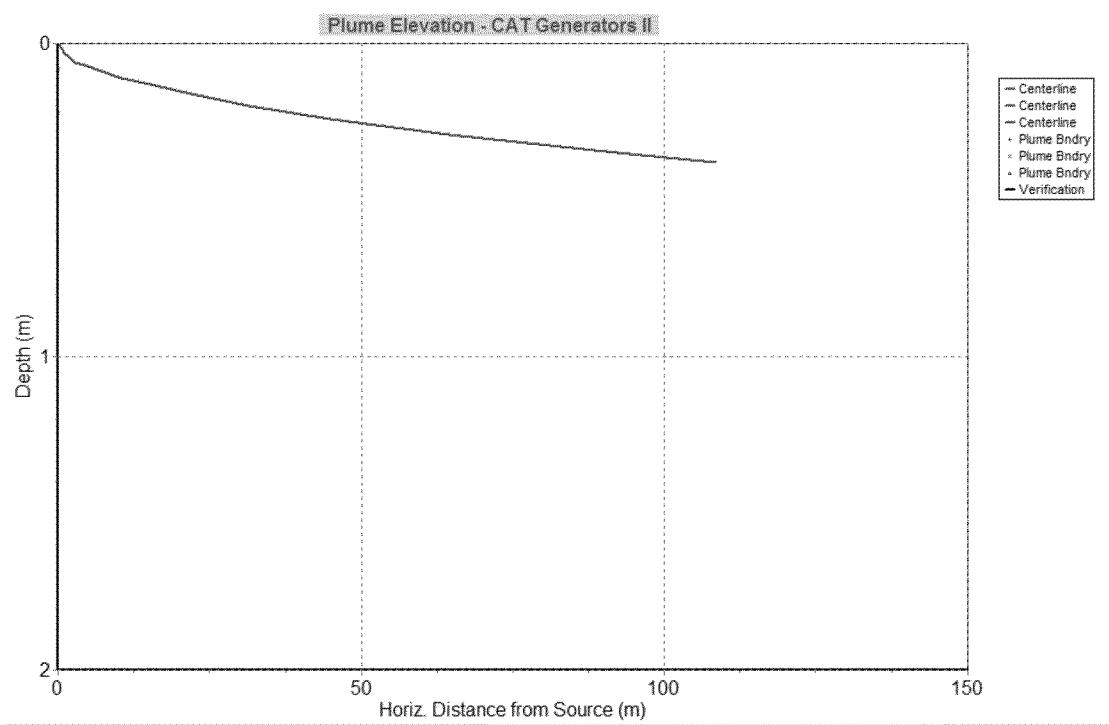
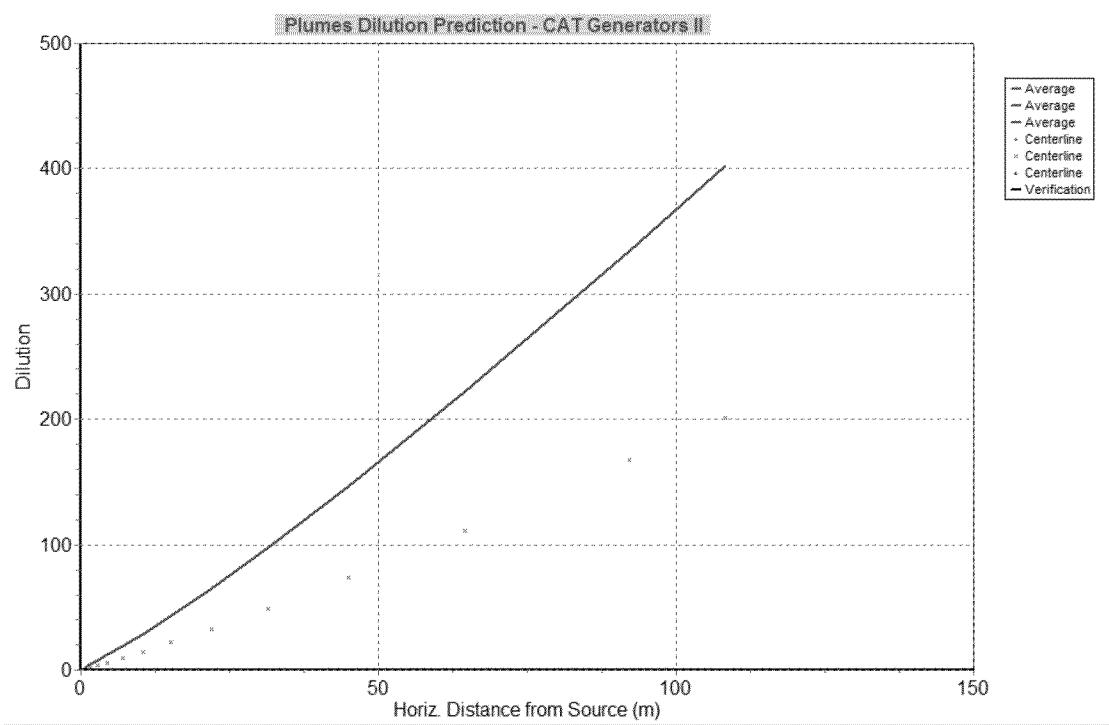
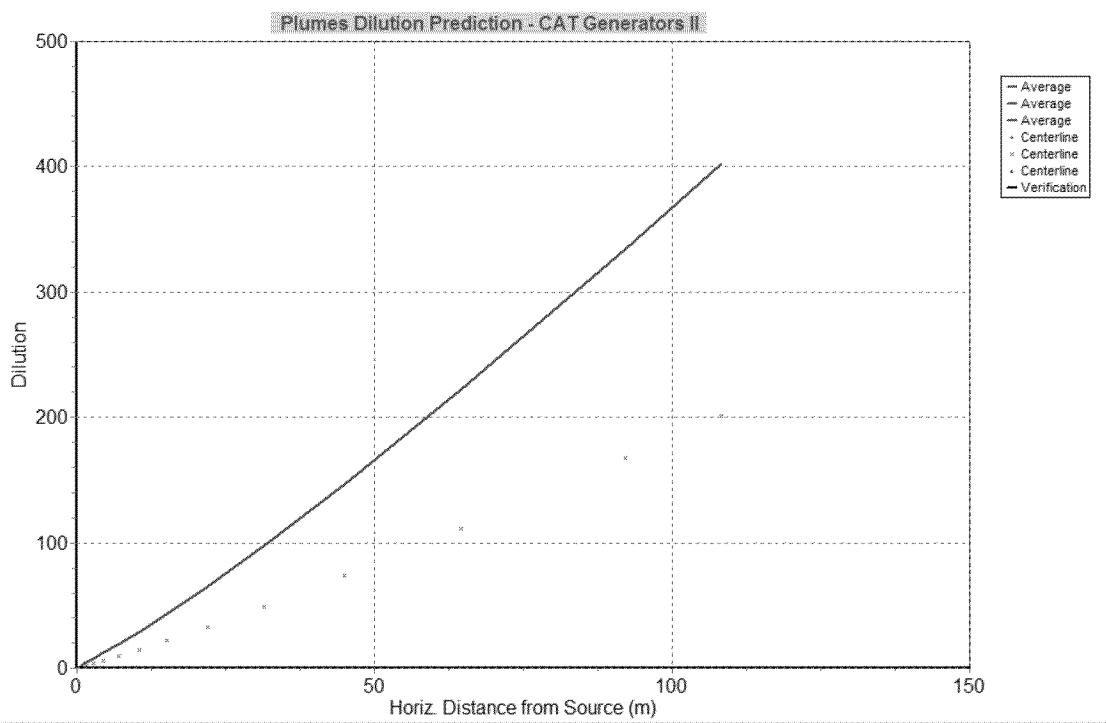
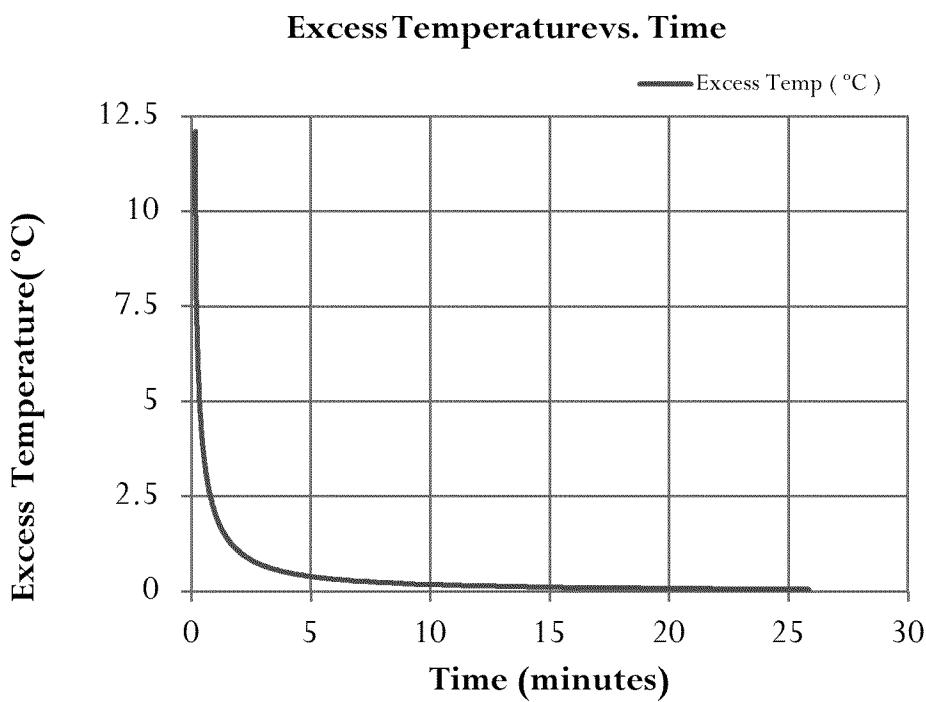


FIGURE 6-4
PLUME DILUTION - CAT GENERATORS II

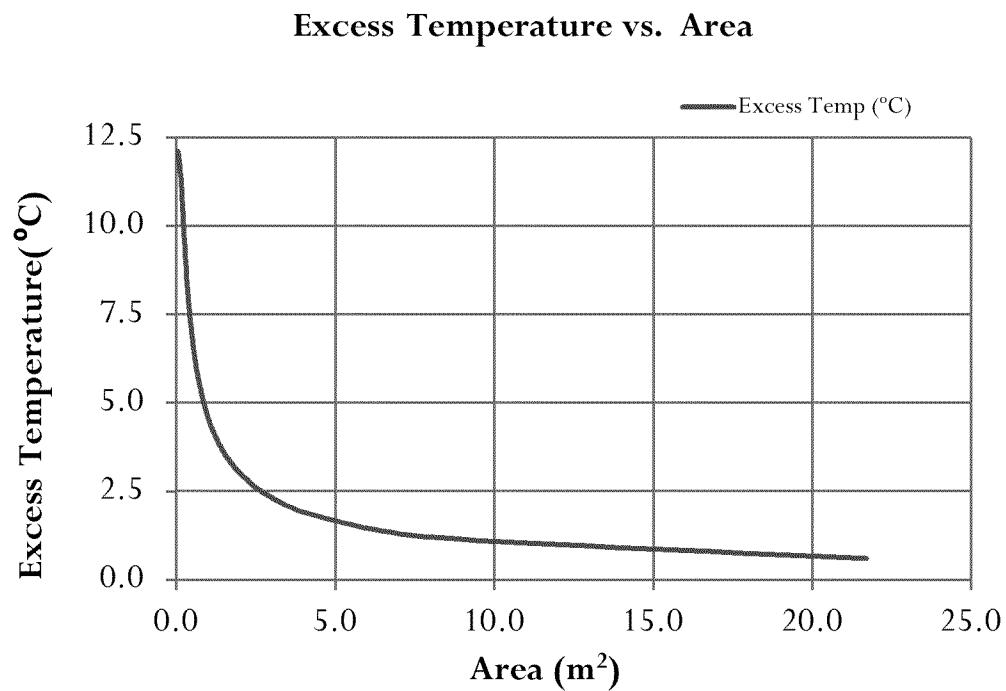


Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 6-5**PLUME TEMPERATURE DECAY - CAT GENERATORS II****FIGURE 6-6****DURATION OF EXCESS TEMPERATURE - CAT GENERATORS II**

Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 6-7
AREA AFFECTED BY EXCESS TEMPERATURE - CAT GENERATORS II



Copyright 2013 by Fluid Dynamix. Company Confidential.

SECTION 7: THERMAL DISPERSION MODELING – EVAPORATOR UNITS

The volume of the non-contact cooling water discharge from *Evaporator Units*, located in Boiler Room is **2,200 bbls/day**. The duration of discharge is 24 hours/day. The temperature and salinity of the effluent are **14.0 °C** and **31 psu**, respectively. The discharge occurs from a 6.09-inch diameter pipe at or near the sea surface. The direction of the discharge is assumed to be aligned with the ambient flow direction for the modeling purpose since the current bends the plume in the direction of flow (Frick 2003). The Visual Plumes model results for: ambient and plume properties; plume path; plume trajectory; plume dilution; and plume temperature decay are presented in **Figures 7-1, 7-2, 7-3, 7-4, and 7-5** respectively. **Figures 7-6 and 7-7** present the duration of the excess temperature and the area affected.

FIGURE 7-1

AMBIENT AND PLUME PROPERTIES - EVAPORATOR UNITS

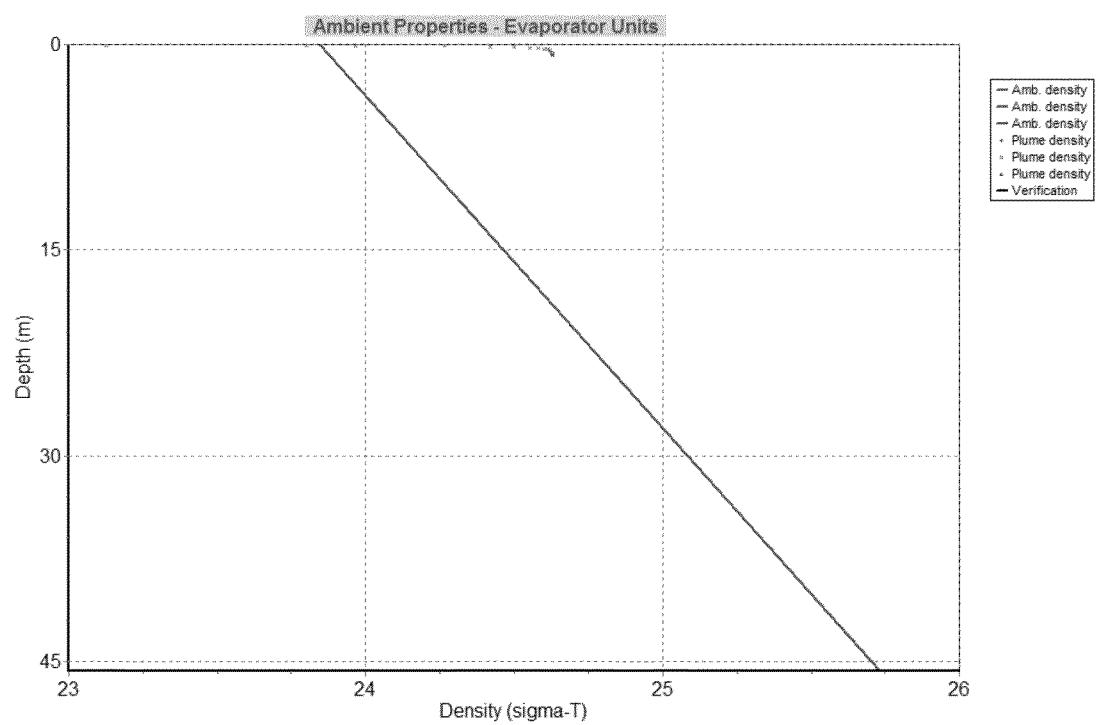


Figure 7-1 presents the ambient and plume densities (σ_T) versus the depth from the sea surface. The ambient density (σ_T) varies from 23.80 kg/m^3 at the surface to 25.77 kg/m^3 at the bottom. As seen above, the thermal plume is released near the sea surface and the initial discharge momentum causes the lighter effluent ($\sigma_T = 23.10 \text{ kg/m}^3$) plume to sink into the ambient only to a depth of approximately 1.0 m. **Figure 7-2** presents the width of the plume. The maximum width of the plume is approximately 15 m at a distance of approximately 140 m from the source. The plume trajectory presented in **Figure 7-3** also shows that the plume reaches a depth of approximately 1.0 m at a distance of approximately 140 m from the source and attains an average dilution factor of 400 as seen in **Figure 7-4**. The plume temperature decay presented in **Figure 7-5** shows that it has cooled to within 0.05°C of the ambient temperature (4°C) at a distance of approximately **140 m** from the source point. It takes approximately thirty (30) minutes for the plume to cool to within 0.05°C of the ambient as presented in **Figure 7-6**. The area affected by excess temperature of 0.05°C or higher is limited to less than forty-five (45) square

meters as seen in **Figure 7-7**. Based on these findings, the impact of this release of the non-contact cooling water on the ambient is insignificant and limited to an area of less than 45 square meters.

FIGURE 7-2
PLUME PATH - EVAPORATOR UNITS

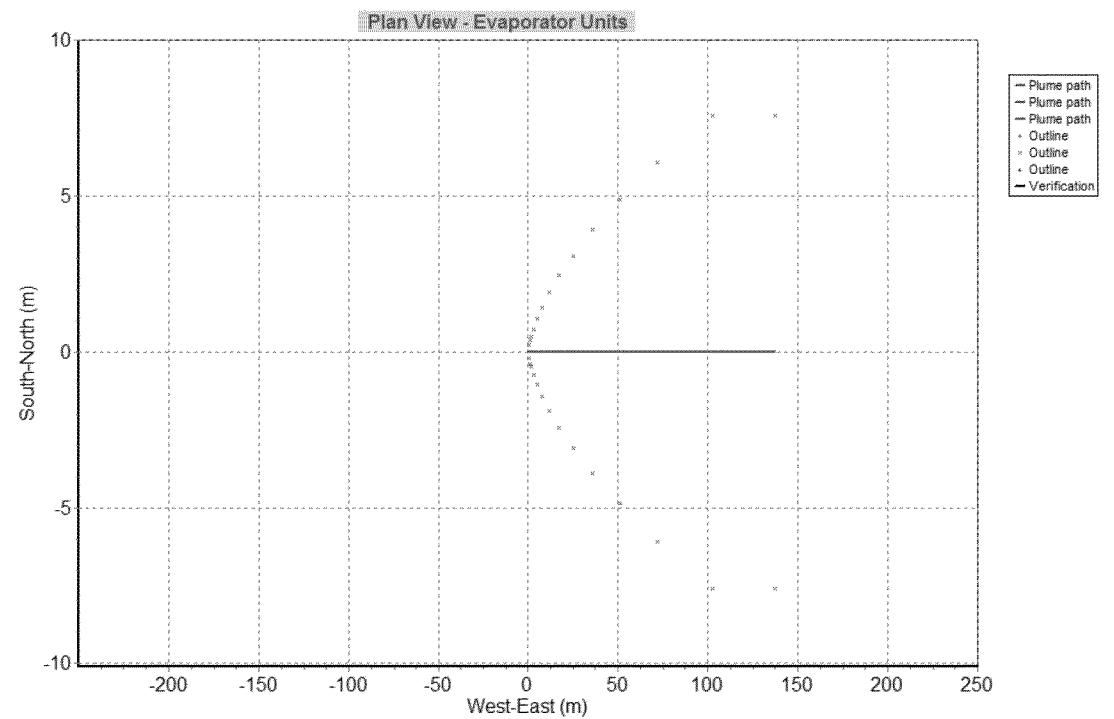


FIGURE 7-3
PLUME TRAJECTORY - EVAPORATOR UNITS

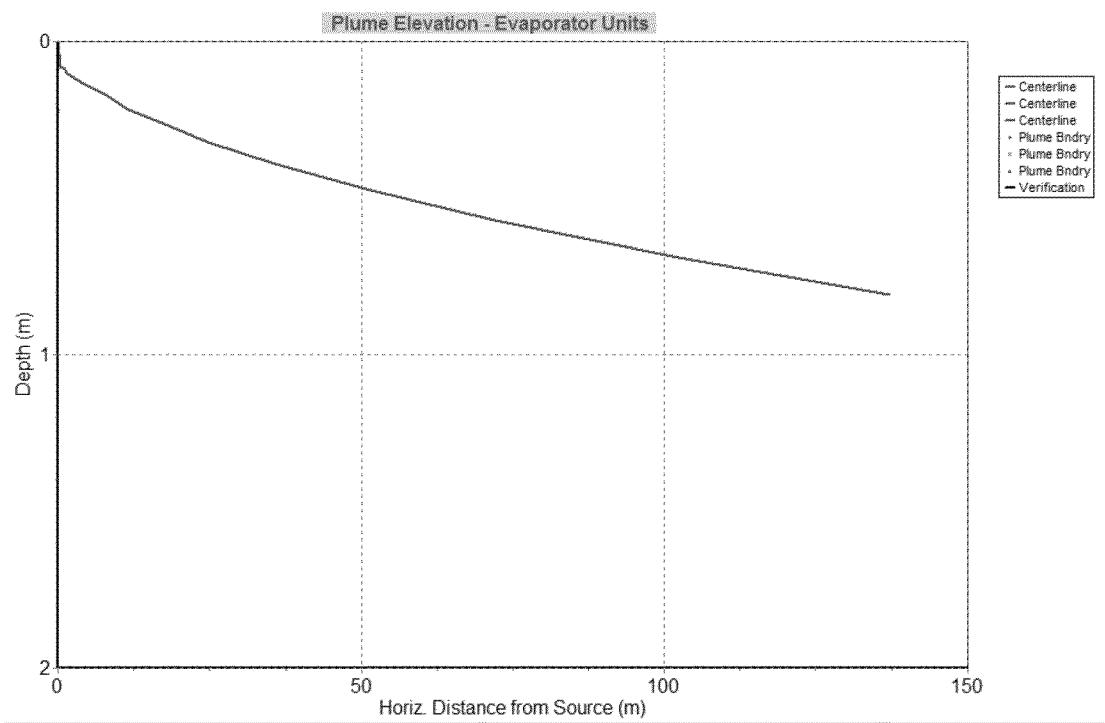
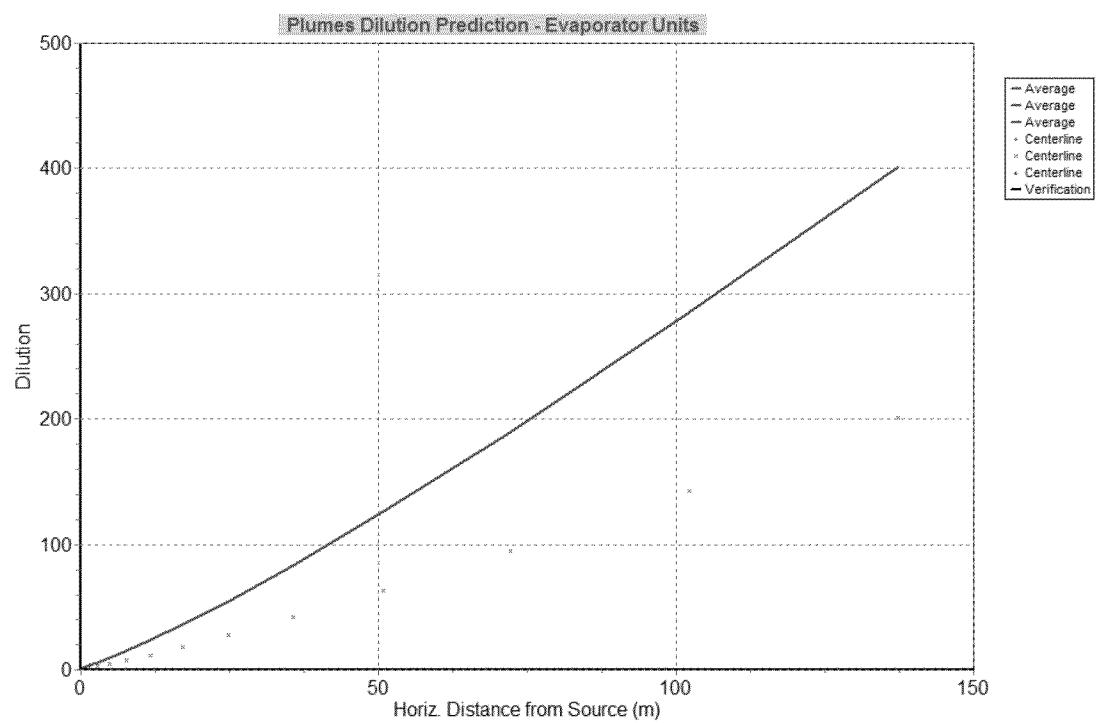


FIGURE 7-4
PLUME DILUTION - EVAPORATOR UNITS



Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 7-5
PLUME TEMPERATURE DECAY - EVAPORATOR UNITS

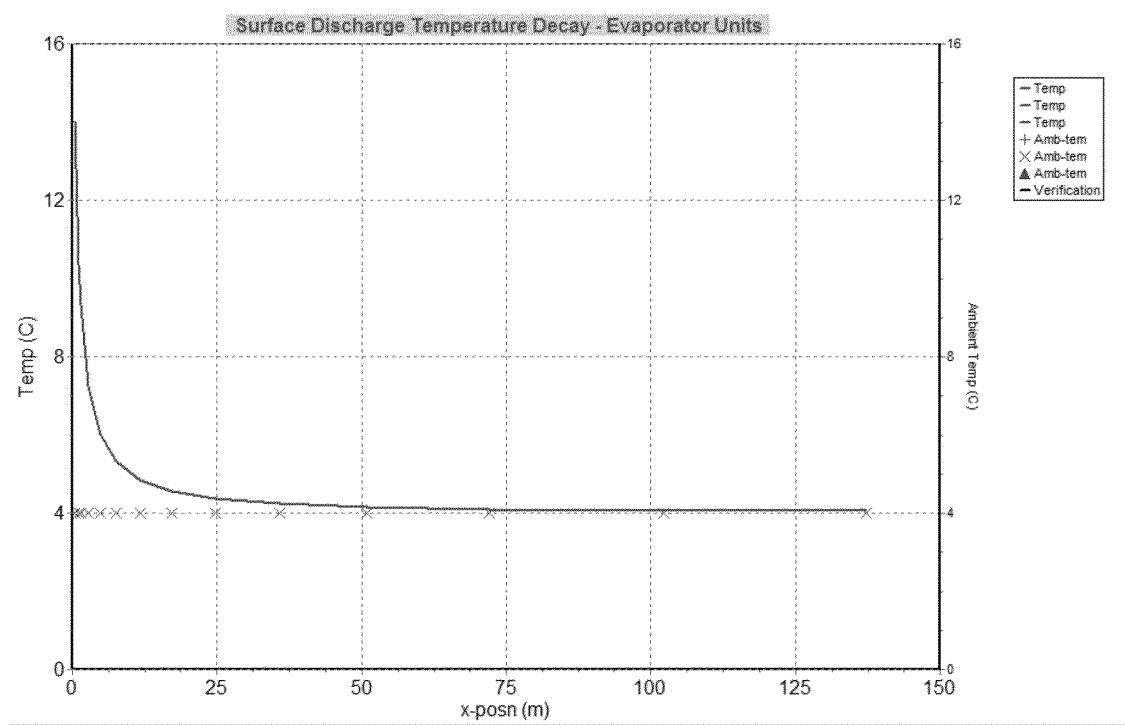
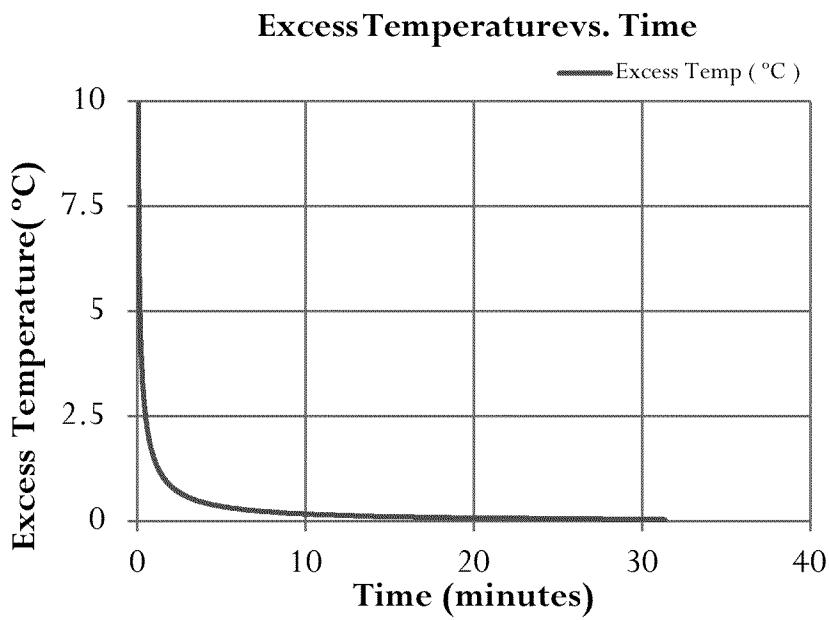
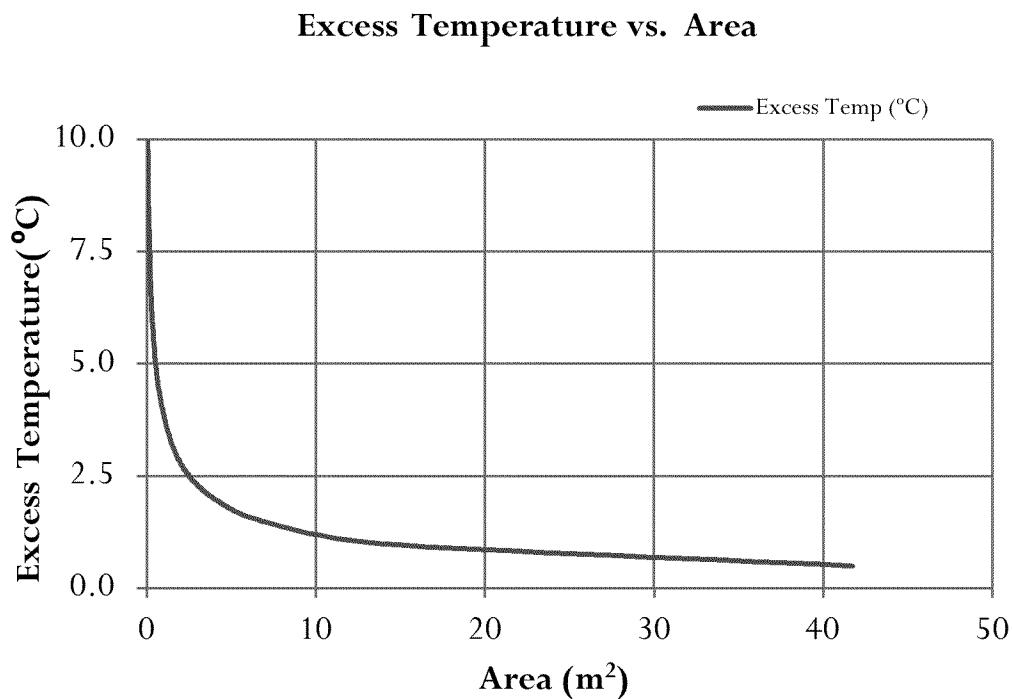


FIGURE 7-6
DURATION OF EXCESS TEMPERATURE - EVAPORATOR UNITS



Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 7-7
AREA AFFECTED BY EXCESS TEMPERATURE - EVAPORATOR UNITS



Copyright 2013 by Fluid Dynamix. Company Confidential.

SECTION 8: THERMAL DISPERSION MODELING – SCR ROOM AC

The volume of the non-contact cooling water discharge from *SCR Room AC*, located in BJ Room is only **70 bbls/day**. The duration of discharge is 24 hours/day. The temperature and salinity of the effluent are **4.2 °C** and **31 psu**, respectively. The discharge occurs from a 4.03-inch diameter pipe at or near the sea surface. The direction of the discharge is assumed to be aligned with the ambient flow direction for the modeling purpose since the current bends the plume in the direction of flow (Frick 2003). The Visual Plumes model results for: ambient and plume properties; plume path; plume trajectory; plume dilution; and plume temperature decay are presented in **Figures 8-1, 8-2, 8-3, 8-4, and 8-5** respectively. **Figures 8-6 and 8-7** present the duration of the excess temperature and the area affected.

FIGURE 8-1
AMBIENT AND PLUME PROPERTIES – SCR ROOM AC

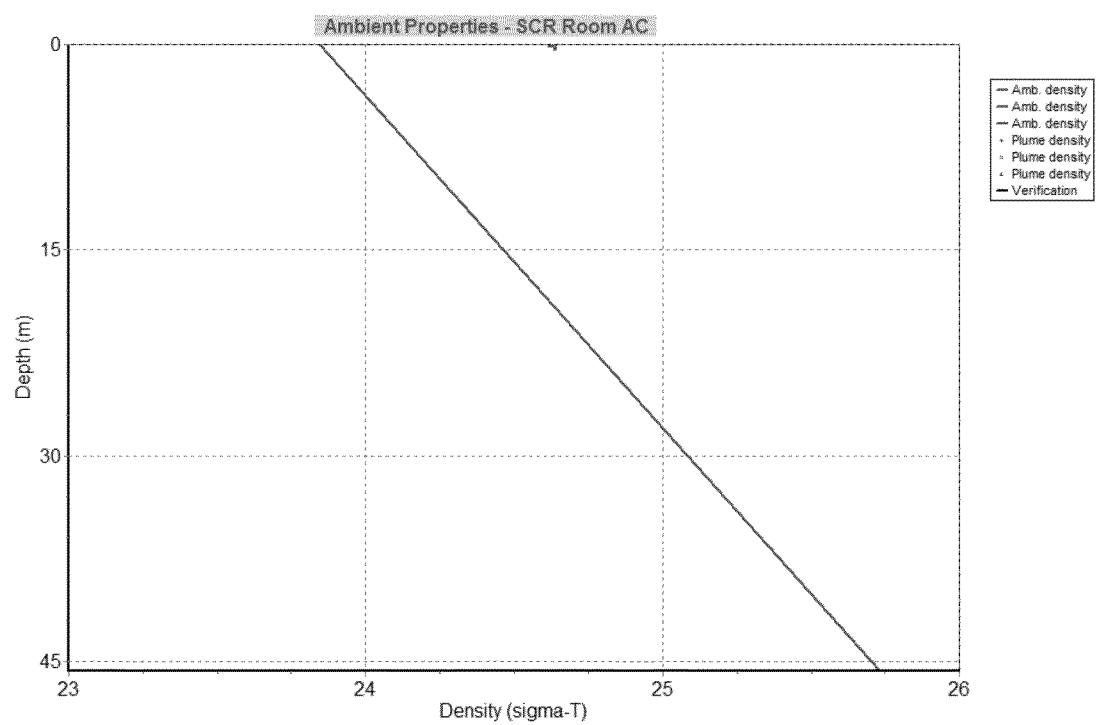


Figure 8-1 presents the ambient and plume densities (σ_T) versus the depth from the sea surface. The ambient density (σ_T) varies from 23.80 kg/m^3 at the surface to 25.77 kg/m^3 at the bottom. As seen above, the thermal plume is released near the sea surface and the initial discharge momentum causes the heavier effluent ($\sigma_T = 24.57 \text{ kg/m}^3$) plume to sink into the ambient only to a depth of approximately 0.5 m. **Figure 8-2** presents the width of the plume. The maximum width of the plume is approximately 2.0 m at a distance of approximately 160 m from the source. The plume trajectory presented in **Figure 8-3** also shows that the plume reaches a depth of less than 0.5 m at a distance of approximately 160 m from the source and attains an average dilution factor of 400 as seen in **Figure 8-4**. The plume temperature decay presented in **Figure 8-5** shows that it has cooled to within $0.05 \text{ }^\circ\text{C}$ of the ambient temperature ($4 \text{ }^\circ\text{C}$) at a distance less than **10 m** from the source point. It takes approximately one minute for the plume to cool to within $0.05 \text{ }^\circ\text{C}$ of the ambient as presented in **Figure 8-6**. The area affected by excess temperature is limited to two square meters only as seen in **Figure 8-7**. Based on

these findings, the impact of this release of the non-contact cooling water on the ambient is insignificant and limited to an area of two square meters only.

FIGURE 8-2
PLUME PATH - SCR Room AC

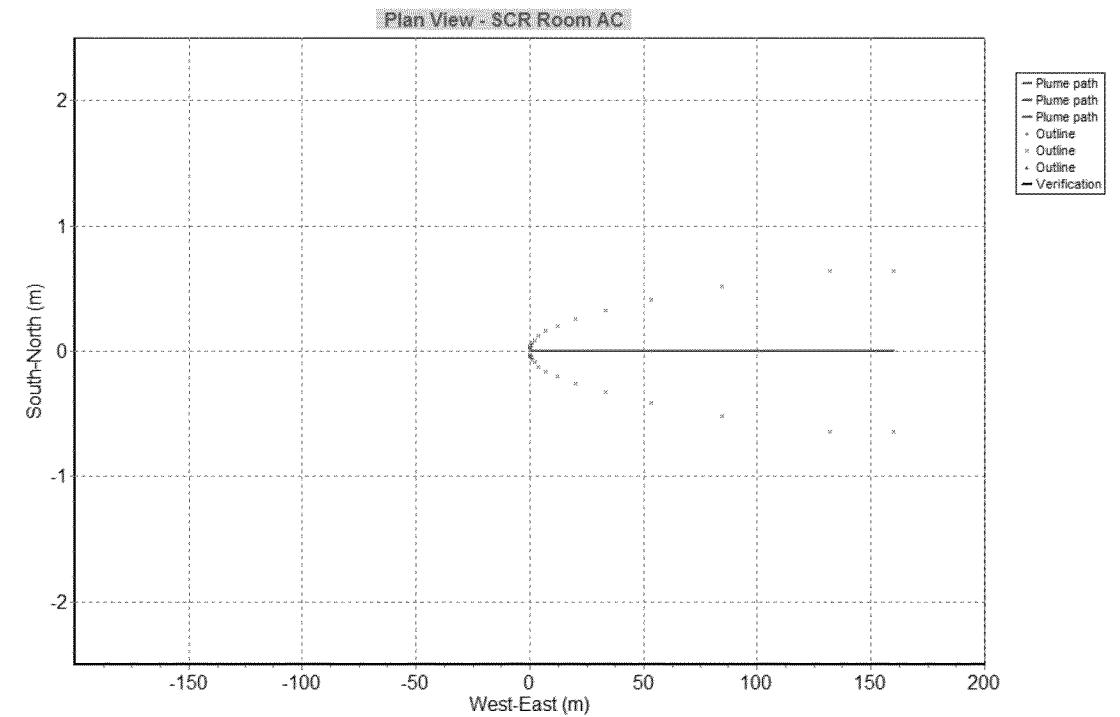


FIGURE 8-3
PLUME TRAJECTORY - SCR ROOM AC

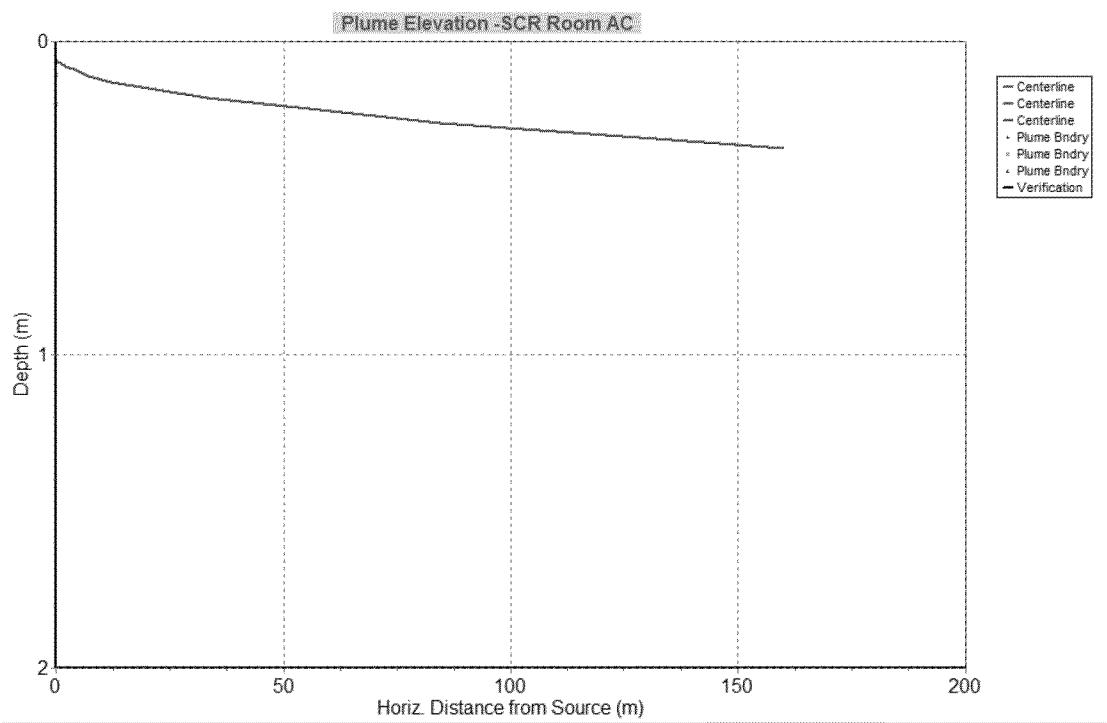
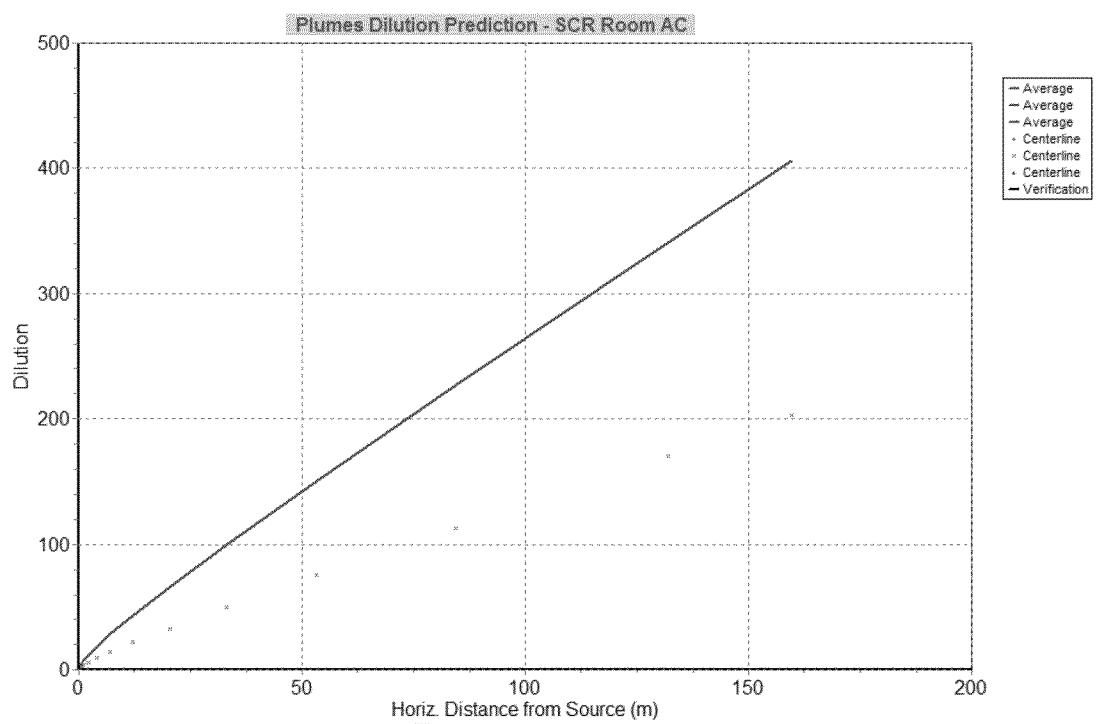


FIGURE 8-4
PLUME DILUTION - SCR ROOM AC



Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 8-5
PLUME TEMPERATURE DECAY - SCR ROOM AC

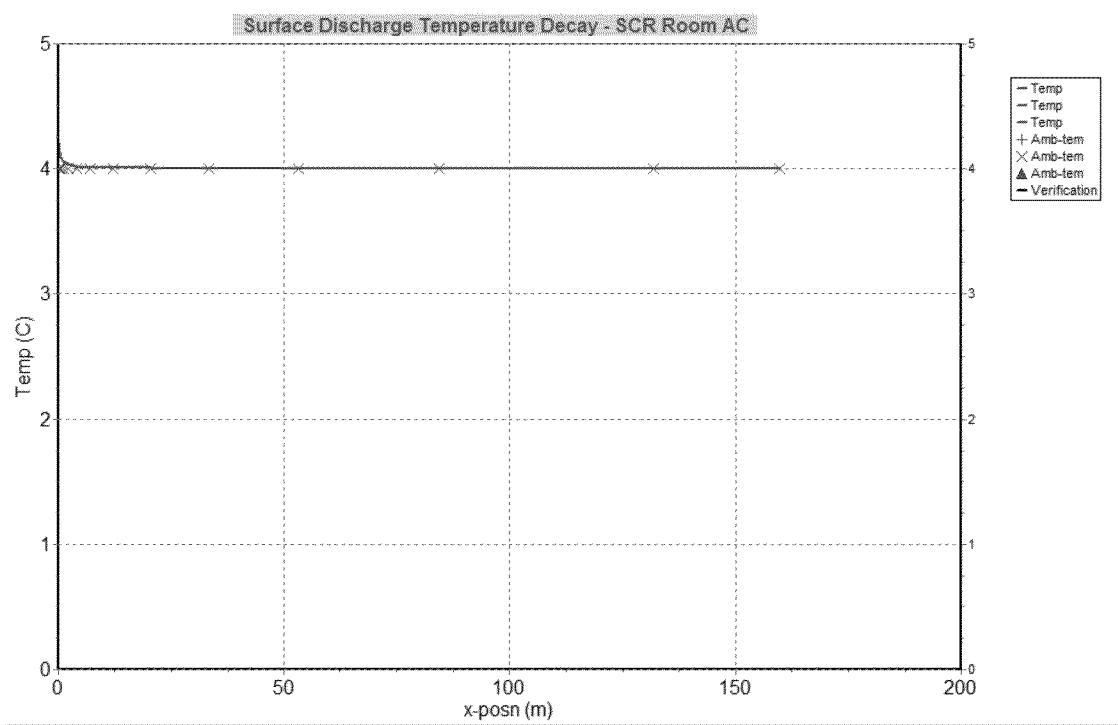
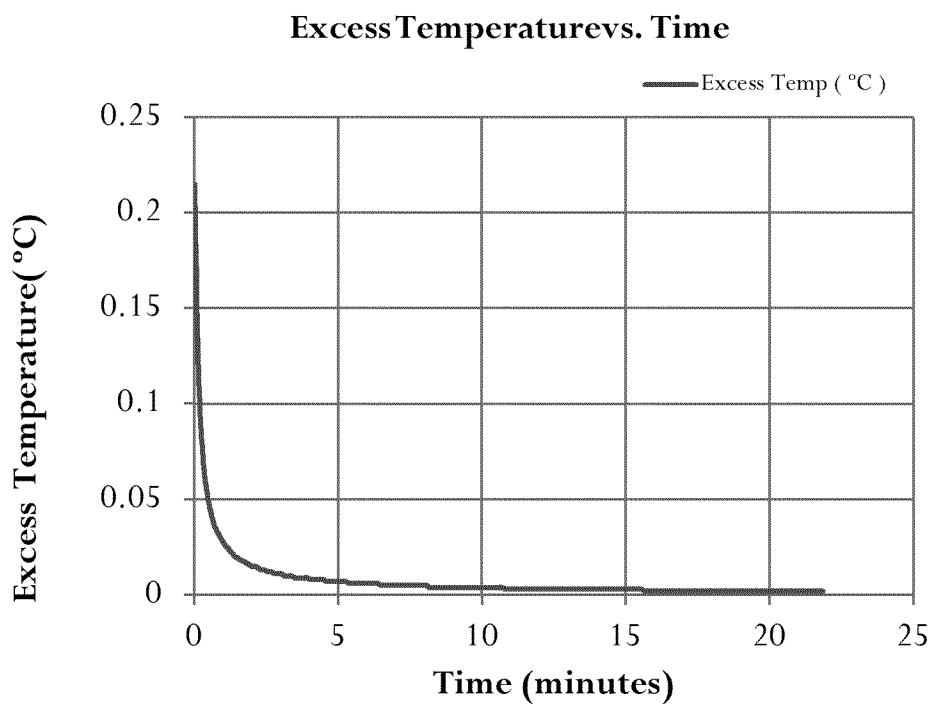
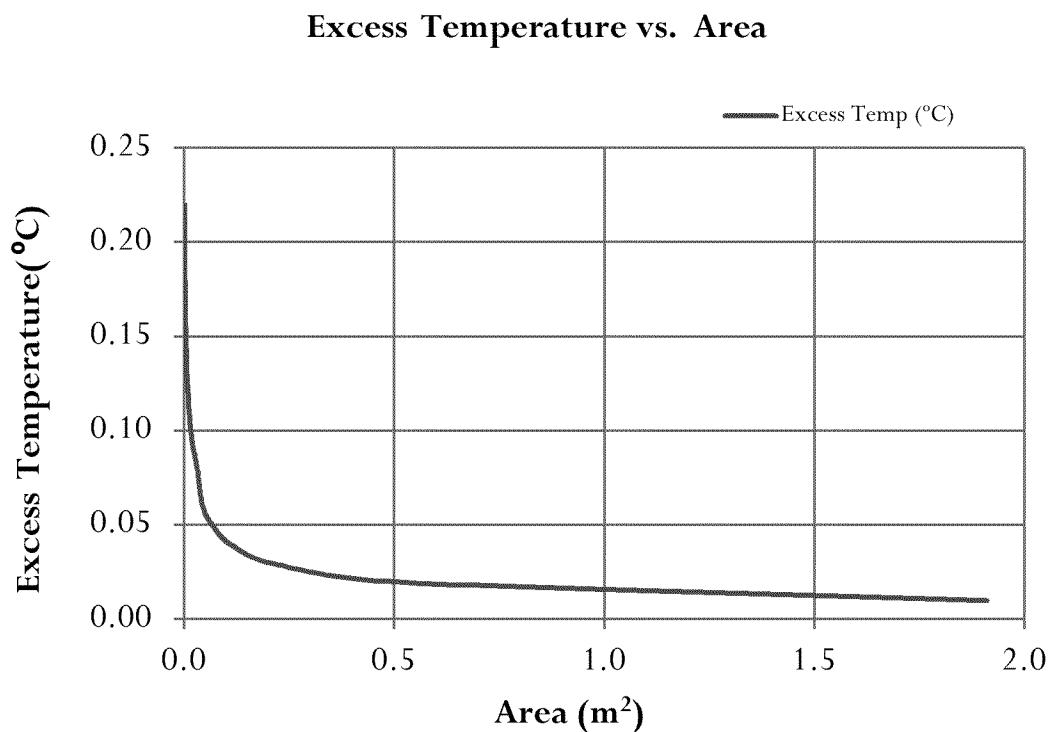


FIGURE 8-6
DURATION OF EXCESS TEMPERATURE - SCR ROOM AC



Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 8-7**AREA AFFECTED BY EXCESS TEMPERATURE - SCR ROOM AC**

Copyright 2013 by Fluid Dynamix. Company Confidential.

SECTION 9: THERMAL DISPERSION MODELING – CEMENT UNIT

The volume of the non-contact cooling water discharge from *Cement Unit*, located in Main Deck at the middle of the ship is **1,115 bbls/day**. The duration of discharge is 24 hours/day. The temperature and salinity of the effluent are **12.0 °C** and **31 psu**, respectively. The discharge occurs from a 4.03-inch diameter pipe at or near the sea surface. The direction of the discharge is assumed to be aligned with the ambient flow direction for the modeling purpose since the current bends the plume in the direction of flow (Frick 2003). The Visual Plumes model results for: ambient and plume properties; plume path; plume trajectory; plume dilution; and plume temperature decay are presented in **Figures 9-1, 9-2, 9-3, 9-4, and 9-5** respectively. **Figures 9-6 and 9-7** present the duration of the excess temperature and the area affected.

FIGURE 9-1

AMBIENT AND PLUME PROPERTIES – CEMENT UNIT

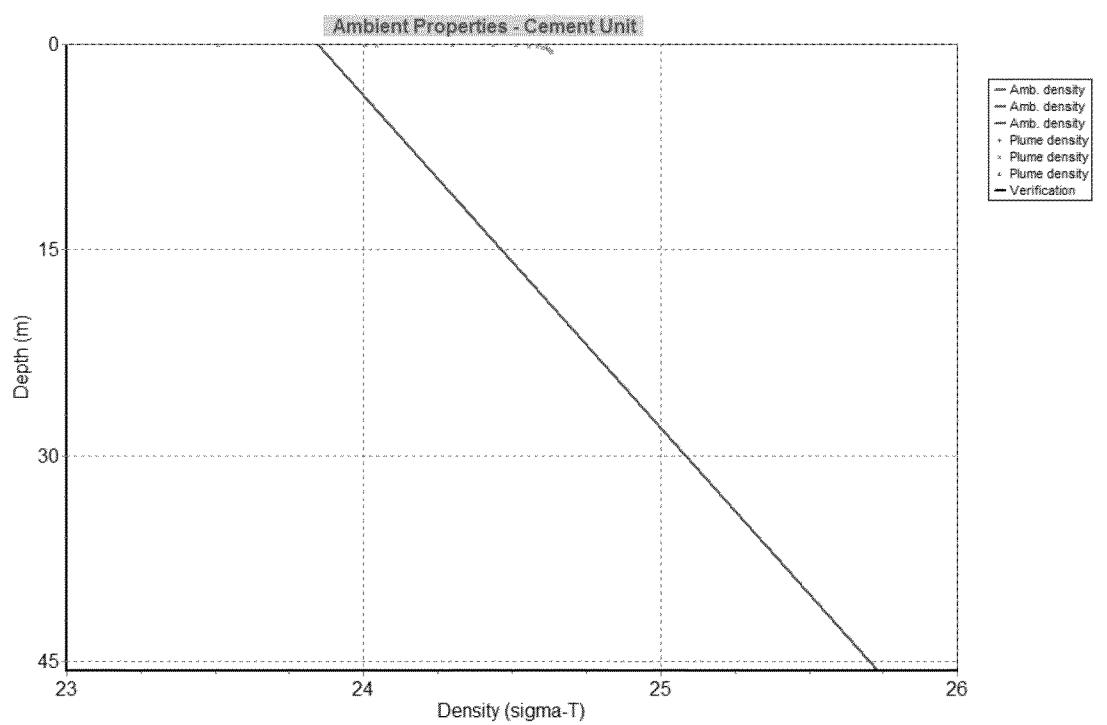


Figure 9-1 presents the ambient and plume densities (σ_T) versus the depth from the sea surface. The ambient density (σ_T) varies from 23.80 kg/m^3 at the surface to 25.77 kg/m^3 at the bottom. As seen above, the thermal plume is released near the sea surface and the initial discharge momentum causes the lighter effluent ($\sigma_T = 23.47 \text{ kg/m}^3$) plume to sink into the ambient only to a depth of approximately 0.70 m. **Figure 9-2** presents the width of the plume. The maximum width of the plume is approximately 12.0 m at a distance of approximately 110 m from the source. The plume trajectory presented in **Figure 9-3** also shows that the plume reaches a depth of approximately 0.70 m at a distance of approximately 110 m from the source and attains an average dilution factor of 400 as seen in **Figure 9-4**. The plume temperature decay presented in **Figure 9-5** shows that it has cooled to within $0.05 \text{ }^\circ\text{C}$ of the ambient temperature ($4 \text{ }^\circ\text{C}$) at a distance of approximately **110 m** from the source point. It takes approximately twenty (20) minutes for the plume to cool to within $0.05 \text{ }^\circ\text{C}$ of the ambient as presented in **Figure 9-6**.

Copyright 2013 by Fluid Dynamix. Company Confidential.

The area affected by excess temperature is limited to seventeen (17) square meters only as seen in **Figure 9-7**. Based on these findings, the impact of this release of the non-contact cooling water on the ambient is insignificant and limited to an area of 17 square meters only.

FIGURE 9-2
PLUME PATH - CEMENT UNIT

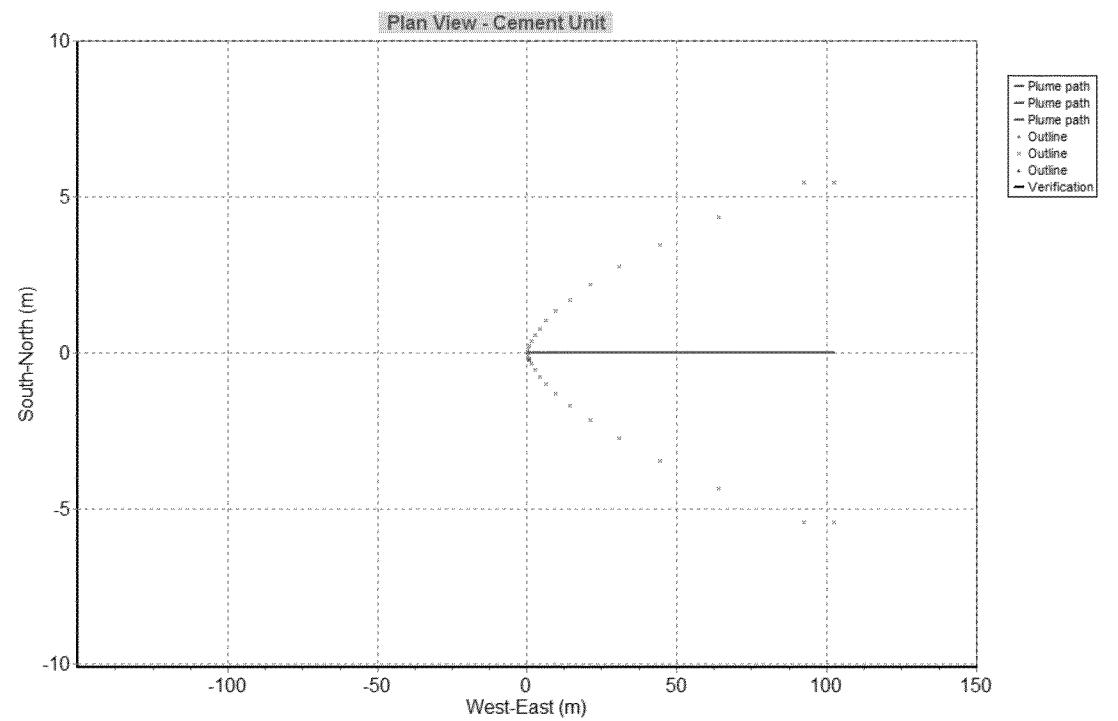


FIGURE 9-3
PLUME TRAJECTORY - CEMENT UNIT

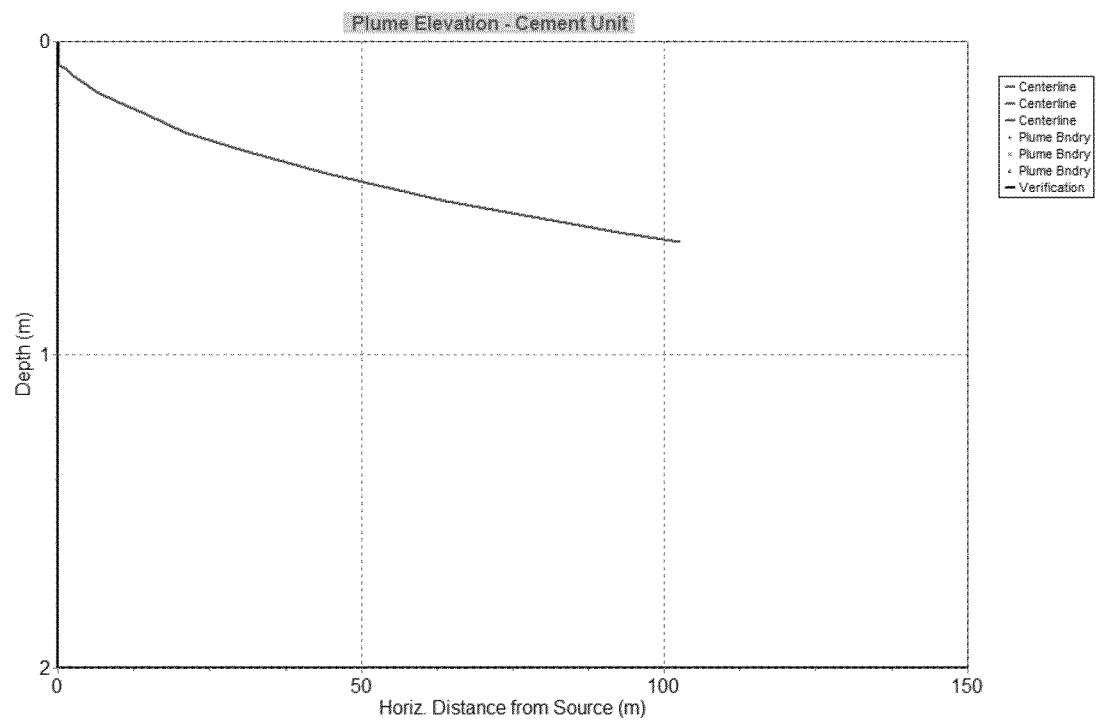
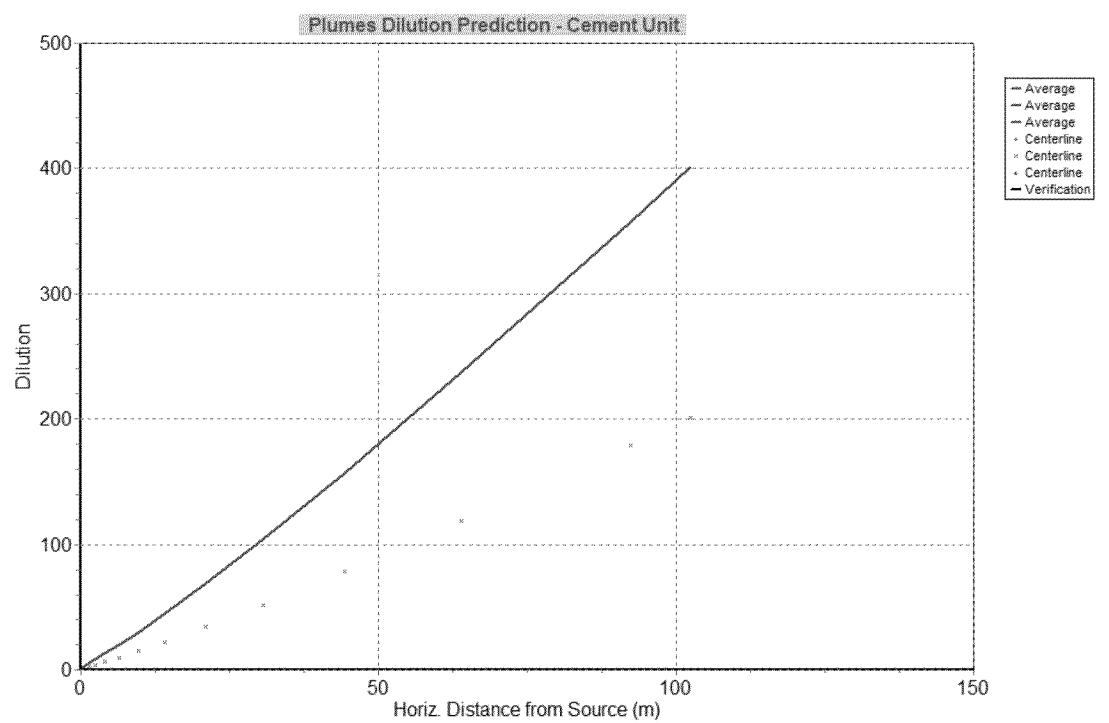


FIGURE 9-4
PLUME DILUTION - CEMENT UNIT



Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 9-5
PLUME TEMPERATURE DECAY - CEMENT UNIT

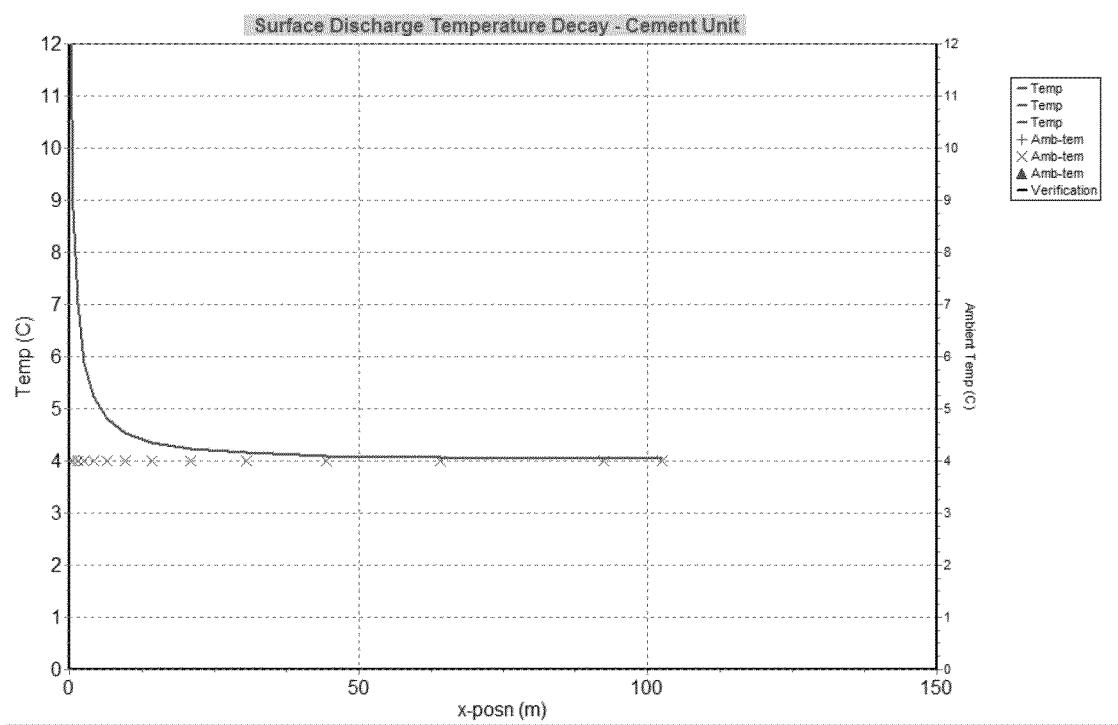
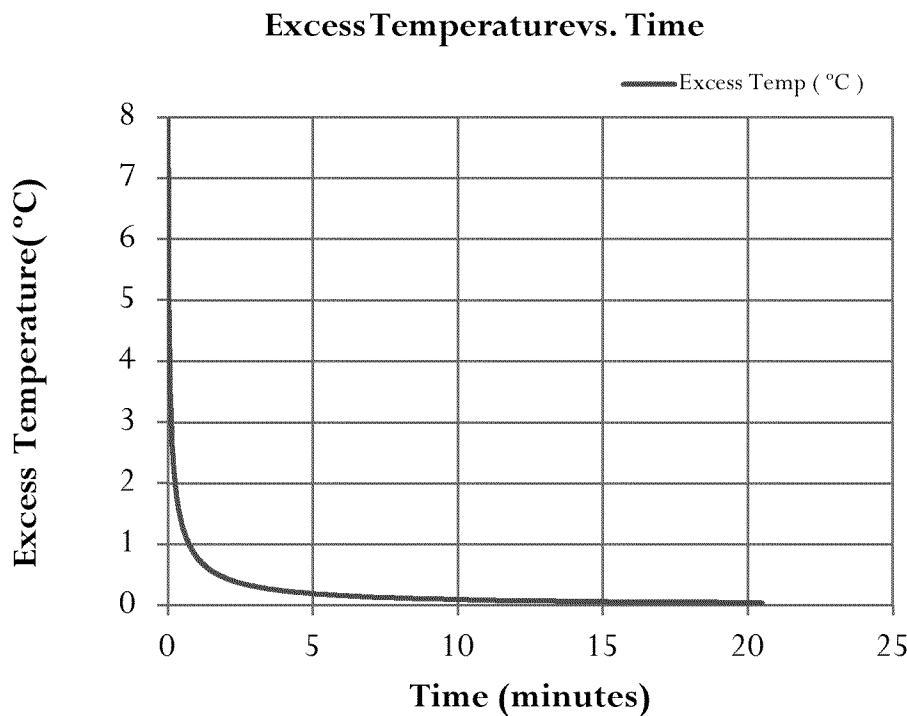
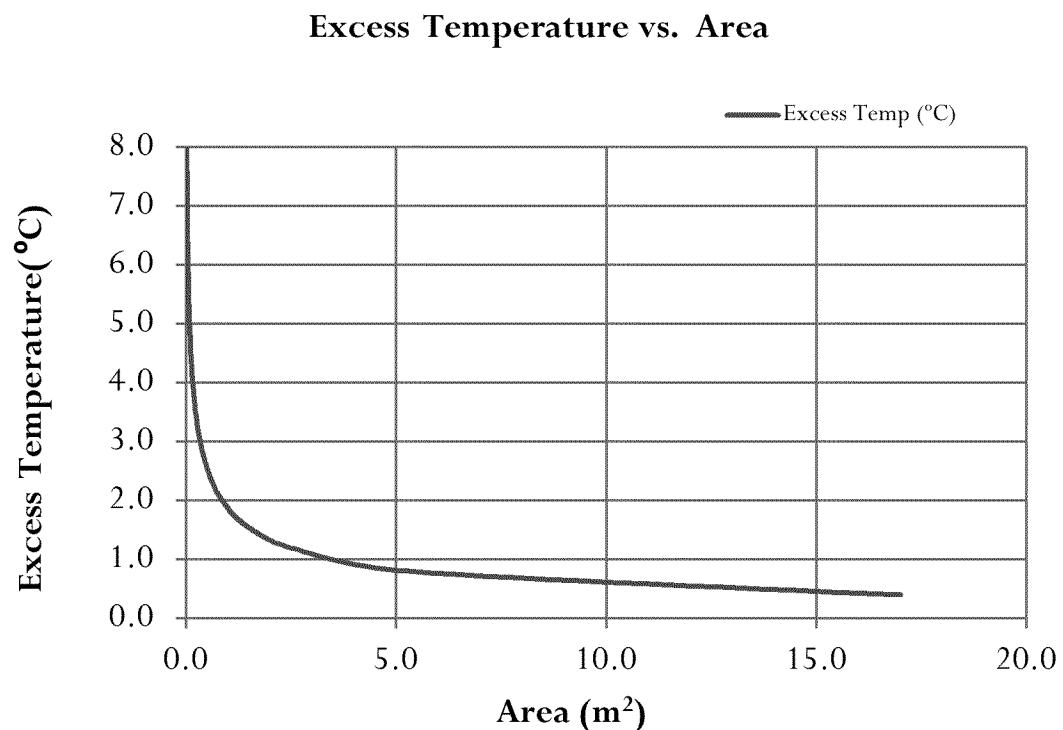


FIGURE 9-6
DURATION OF EXCESS TEMPERATURE - CEMENT UNIT



Copyright 2013 by Fluid Dynamix. Company Confidential.

FIGURE 9-7
AREA AFFECTED BY EXCESS TEMPERATURE - CEMENT UNIT



Copyright 2013 by Fluid Dynamix. Company Confidential.

SECTION 10: SUMMARY AND CONCLUSION

**TABLE 3: IMPACT OF NON-CONTACT COOLING WATER DISCHARGES ON THE AMBIENT WATER QUALITY
BURGER FIELD, OFFSHORE CHUKCHI SEA**

Non-Contact Cooling Water	Discharge Type	Effluent Sources and Characteristics				Impact on the Ambient Water Quality based on the US EPA Visual Plumes Thermal Dispersion Numeric Simulations					Conclusion
		Discharge Source	Volume Discharged (bbls/day)	Temp (°C)	Effluent Salinity (psu)	Excess Temperature (°C)	Plume Depth (m)	Plume Width (m)	Distance from the Source (m)	Duration (minutes)	
	House A/C and Refrigeration Units	4,165	5.1	31		0.05	2.5	10	250	20	25.0
	Hydraulic Unit, Compressor Chiller & Rig Brake	4,760	4.2	31		3.0	10	150	10	12.5	
	CAT Generators I	610	16.1	31		0.5	10	110	15	25.0	
	CAT Generators II	610	16.1	31							
	Evaporator Units	2,200	14.0	31		1.0	15	140	30	45.0	
	SCR Room A/C	70	4.2	31		0.5	2	10	1	2.0	
	Cement Unit	1,115	12.0	31		0.7	12	110	20	17.0	

The potential impact matrix on the ambient water quality presented above in **Table 3**, presents the following data:

- Maximum plume depth: 3.0 m
- Maximum plume width: 15.0 m
- Maximum distance from the source: 250.0 m
- Maximum duration: 30.0 minutes
- Maximum area affected: 45.0 square meters

Therefore, the above listed non-contact cooling water sources has insignificant impact on the ambient water quality.

SECTION 11: REFERENCES

Frick, W.E., et al., 2003. Dilution Models for Effluent Discharges, 4th Edition (Visual Plumes): US EPA's Ecosystems Research Division, National Exposure Research Laboratory, U.S. Environmental Protection Agency, Athens, Georgia.

Copyright 2013 by Fluid Dynamix. Company Confidential.

APPENDICES

Copyright 2013 by Fluid Dynamix. Company Confidential.

APPENDIX A: GENERAL MODEL INPUT DATA
TABLE A.1

MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
EFFLUENT PORT DIAMETER, FLOW AREA, EQUIVALENT SQUARES, AND EFFLUENT TEMPERATURES.

Non-contact Cooling Water Unit	Location	Outer Diameter (inches)	Internal Diameter (inches)	Internal Flow Area (sq. in)	Equivalent Square (in)	Noble Discoverer Starboard	Port	Effluent Temperature (C°)
House A/C and Refrigeration Units	Main Engine Room	6.65	6.1	29.14	5.4	x		5.1
Hydraulic Unit, Compressor Chiller & Rig Brake	MCC Room	4.5	4.0	12.74	3.6		x	4.2
CAT Generators I	Generator Room	6.65	6.1	29.14	5.4	x	x	16.1
CAT Generators II	Generator Room	6.65	6.1	29.14	5.4	x	x	16.1
Evaporator Units	Boiler Room	6.65	6.1	29.14	5.4	x	x	14
SCR Room A/C	BJ Room	4.5	4.0	12.74	3.6	x		4.2
Cement Unit	Main Deck, Mid Ship	4.5	4.0	12.74	3.6		x	12

TABLE A.2

MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
EFFLUENT IDENTIFICATION, LOCATION, PORT DIAMETER, DISCHARGE VOLUME, TEMPERATURES, AND SALINITIES.

Discharge Type	Discharge Number	Discharge Description	Location	Volume Discharged (bbls/day)	Discharge Duration (hours/day)	Internal Diameter (inches)	Effluent Temp (°C)	Effluent Salinity (psu)
Non-Contact Cooling Water	009	House A/C and Refrigeration Units	Starboard /Aft	4,165	24	6.09	5.1	31
		Hydraulic Unit, Compressor Chiller & Rig Brake	Port/Mid	4,760	24	4.03	4.2	31
		Cat Generators I	Starboard /Bow	610	24	6.09	16.1	31
		Cat Generators II	Port/Bow	610	24	6.09	16.1	31
		Evaporator Units	Starboard /Port	2,200	24	6.09	14.0	31
		SCR Room A/C	Starboard /Mid	70	24	4.03	4.2	31
		Cement Unit	Starboard /Mid	223 ¹	18-24 ²	4.03	12.0	31

Notes to Table:**1: bbls/discharge, 5 discharges per well****2: while cementing**

TABLE A.3**MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA**

AMBIENT WATER DEPTH, TEMPERATURES, SALINITIES, CURRENT SPEED, AND DIRECTIONS FOR THE PLANNED DRILLING PERIOD. THE PLANNED DRILLING PERIOD IS WITHIN THE OPEN WATER SEASON OF JULY THRU OCTOBER.

Water depth m	Temp (°C)	Salinity psu	Current	
			Speed (cm/s)	Direction
0	4	30	7	to the East
43.9 - 45.7	-0.5	32	7	to the East

TABLE A.4
MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE AMBIENT TEMPERATURE

TABLE A.5
MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE AMBIENT SALINITY

TABLE A.6
MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE AMBIENT CURRENT SPEED

1.00 24.00 m/s 0.0 extra extra m 0 45.7

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

0.07 0.07

Copyright 2013 by Fluid Dynamix. Company Confidential.

TABLE A.7
MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE AMBIENT CURRENT DIRECTION

1.00 24.00 deg 0.0 extra extra m 0 45.7

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

0.00.0

</div

APPENDIX B: MODEL INPUT DATA - HOUSE A/C AND REFRIGERATION UNITS**TABLE B.1****MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE EFFLUENT VOLUME DISCHARGED
HOUSE A/C AND REFRIGERATION UNITS**

1.0 24 bbl/d TS series.flo

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

4165.0

TABLE B.2

**VISUAL PLUMES MODEL TEXT OUTPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
HOUSE A/C AND REFRIGERATION UNITS**

VISUAL PLUMES MODEL TEXT OUTPUT PDS FILE CONTENTS ARE LISTED BELOW

PDSWIN - FLOATING WARM WATER JETS --

AMBIENT CONDITIONS: TEMP. TA= 4.0 DEG. C ; VEL. =0.07 M/S

HEAT CONVECTION = 1

DISCHARGE CONDITIONS: TEMP. = 5.1 C; DEPTH = 0.14 M. ; WIDTH = 0.14 M.

ANGLE 0.0 DEG; DISCHARGE RATE = 0.01 CU-M/S

DISCHARGE DENSIMENTRIC FROUDE NO. = 351372.75

X(M.)	Y(M.)	EX.TEMP (DEG. C)	TIME (SEC.)	Q/Q0 (DILU.)	QM/Q0	DEPTH(M.)	WIDTH(M.)
0.01	0	1.115	0.027	2	1	0.2	0.2
0.02	0	1.089	0.053	2.05	1.02	0.2	0.21
0.03	0	1.065	0.080	2.09	1.05	0.2	0.22
0.04	0	1.042	0.108	2.14	1.07	0.2	0.23
0.05	0	1.021	0.136	2.18	1.09	0.2	0.23
0.06	0	1.001	0.164	2.23	1.11	0.2	0.24
0.08	0	0.982	0.193	2.27	1.14	0.21	0.25
0.1	0	0.947	0.253	2.36	1.18	0.21	0.26
0.12	0	0.915	0.313	2.44	1.22	0.21	0.27
0.14	0	0.886	0.376	2.52	1.26	0.21	0.28
0.16	0	0.859	0.440	2.6	1.3	0.21	0.3
0.2	0	0.811	0.573	2.75	1.37	0.22	0.32
0.25	0	0.77	0.711	2.9	1.45	0.22	0.34
0.29	0	0.734	0.855	3.04	1.52	0.22	0.36
0.33	0	0.702	1.000	3.18	1.59	0.23	0.38
0.42	0	0.647	1.320	3.45	1.72	0.24	0.42
0.5	0	0.602	1.650	3.71	1.85	0.24	0.46
0.59	0	0.563	2.000	3.96	1.98	0.25	0.5
0.68	0	0.53	2.360	4.21	2.1	0.26	0.53
0.85	0	0.477	3.130	4.69	2.34	0.27	0.6
1.02	0	0.434	3.960	5.15	2.58	0.28	0.66
1.19	0	0.399	4.830	5.61	2.8	0.29	0.71
1.36	0	0.369	5.750	6.05	3.02	0.31	0.77
1.7	0	0.325	7.720	6.92	3.46	0.33	0.87
2.05	0	0.29	9.830	7.76	3.88	0.35	0.96
2.39	0	0.262	12.100	8.59	4.29	0.37	1.05

Copyright 2013 by Fluid Dynamix. Company Confidential.

2.73	0	0.239	14.400	9.4	4.7	0.38	1.13
3.08	0	0.221	16.900	10.2	5.1	0.4	1.2
3.42	0	0.205	19.500	10.99	5.5	0.42	1.27
4.1	0	0.18	24.800	12.55	6.27	0.45	1.41
4.79	0	0.161	30.500	14.07	7.04	0.48	1.53
5.48	0	0.145	36.400	15.57	7.79	0.5	1.64
6.16	0	0.133	42.600	17.05	8.53	0.53	1.75
6.85	0	0.122	48.900	18.51	9.26	0.55	1.85
7.53	0	0.113	55.400	19.96	9.98	0.57	1.95
8.22	0	0.106	62.100	21.39	10.69	0.6	2.04
8.9	0	0.099	68.900	22.81	11.4	0.62	2.13
9.59	0	0.093	75.900	24.21	12.11	0.64	2.21
10.28	0	0.088	82.900	25.61	12.8	0.65	2.29
10.96	0	0.084	90.100	26.99	13.5	0.67	2.37
11.65	0	0.08	97.400	28.37	14.19	0.69	2.45
12.33	0	0.076	105.000	29.74	14.87	0.71	2.52
13.02	0	0.073	112.000	31.1	15.55	0.72	2.59
13.71	0	0.07	120.000	32.45	16.23	0.74	2.66
14.39	0	0.067	127.000	33.8	16.9	0.76	2.73
15.08	0	0.064	135.000	35.14	17.57	0.77	2.79
15.76	0	0.062	143.000	36.47	18.24	0.79	2.86
16.45	0	0.06	150.000	37.8	18.9	0.8	2.92
17.13	0	0.058	158.000	39.12	19.56	0.81	2.98
17.82	0	0.056	166.000	40.44	20.22	0.83	3.04
18.51	0	0.054	174.000	41.75	20.87	0.84	3.1
19.19	0	0.053	182.000	43.06	21.53	0.86	3.15
19.88	0	0.051	190.000	44.36	22.18	0.87	3.21
20.56	0	0.05	198.000	45.66	22.83	0.88	3.27
21.25	0	0.048	206.000	46.95	23.48	0.89	3.32
21.94	0	0.047	214.000	48.24	24.12	0.91	3.37
22.62	0	0.046	223.000	49.53	24.76	0.92	3.43
23.31	0	0.045	231.000	50.81	25.41	0.93	3.48
23.99	0	0.043	239.000	52.09	26.05	0.94	3.53
24.68	0	0.042	247.000	53.37	26.68	0.95	3.58
25.36	0	0.041	256.000	54.64	27.32	0.96	3.63
26.05	0	0.04	264.000	55.91	27.95	0.98	3.67
26.74	0	0.04	272.000	57.18	28.59	0.99	3.72
27.42	0	0.039	281.000	58.44	29.22	1	3.77
28.11	0	0.038	289.000	59.7	29.85	1.01	3.82
28.79	0	0.037	298.000	60.96	30.48	1.02	3.86
29.48	0	0.036	306.000	62.21	31.11	1.03	3.91
30.16	0	0.036	315.000	63.47	31.73	1.04	3.95

Copyright 2013 by Fluid Dynamix. Company Confidential.

30.85	0	0.035	323.000	64.72	32.36	1.05	4
31.54	0	0.034	332.000	65.96	32.98	1.06	4.04
32.22	0	0.034	340.000	67.21	33.6	1.07	4.08
32.91	0	0.033	349.000	68.45	34.23	1.08	4.13
33.59	0	0.032	357.000	69.69	34.85	1.09	4.17
34.28	0	0.032	366.000	70.93	35.47	1.1	4.21
34.97	0	0.031	375.000	72.17	36.08	1.11	4.25
35.65	0	0.031	383.000	73.4	36.7	1.12	4.29
36.34	0	0.03	392.000	74.64	37.32	1.13	4.33
37.02	0	0.03	401.000	75.87	37.93	1.14	4.37
37.71	0	0.029	409.000	77.1	38.55	1.15	4.41
38.39	0	0.029	418.000	78.32	39.16	1.16	4.45
39.08	0	0.028	427.000	79.55	39.77	1.16	4.49
39.77	0	0.028	435.000	80.77	40.39	1.17	4.53
40.45	0	0.028	444.000	81.99	41	1.18	4.57
41.14	0	0.027	453.000	83.21	41.61	1.19	4.6
41.82	0	0.027	462.000	84.43	42.22	1.2	4.64
42.51	0	0.026	471.000	85.65	42.82	1.21	4.68
43.19	0	0.026	479.000	86.86	43.43	1.22	4.72
43.88	0	0.026	488.000	88.08	44.04	1.22	4.75
44.57	0	0.025	497.000	89.29	44.64	1.23	4.79
45.25	0	0.025	506.000	90.5	45.25	1.24	4.83
45.94	0	0.025	515.000	91.71	45.85	1.25	4.86
46.62	0	0.024	524.000	92.91	46.46	1.26	4.9
47.31	0	0.024	532.000	94.12	47.06	1.27	4.93
48	0	0.024	541.000	95.33	47.66	1.27	4.97
48.68	0	0.023	550.000	96.53	48.26	1.28	5
49.37	0	0.023	559.000	97.73	48.87	1.29	5.03
50.05	0	0.023	568.000	98.93	49.47	1.3	5.07
50.74	0	0.023	577.000	100.13	50.07	1.3	5.1
51.42	0	0.022	586.000	101.33	50.66	1.31	5.14
52.11	0	0.022	595.000	102.53	51.26	1.32	5.17
52.8	0	0.022	604.000	103.72	51.86	1.33	5.2
53.48	0	0.022	613.000	104.92	52.46	1.34	5.24
54.17	0	0.021	622.000	106.11	53.06	1.34	5.27
54.85	0	0.021	631.000	107.3	53.65	1.35	5.3
55.54	0	0.021	640.000	108.49	54.25	1.36	5.33
56.23	0	0.021	649.000	109.68	54.84	1.36	5.37
56.91	0	0.02	658.000	110.87	55.44	1.37	5.4
57.6	0	0.02	667.000	112.06	56.03	1.38	5.43
58.28	0	0.02	676.000	113.25	56.62	1.39	5.46
58.97	0	0.02	685.000	114.43	57.22	1.39	5.49

Copyright 2013 by Fluid Dynamix. Company Confidential.

59.65	0	0.02	694.000	115.62	57.81	1.4	5.52
60.34	0	0.019	703.000	116.8	58.4	1.41	5.55
61.03	0	0.019	712.000	117.99	58.99	1.41	5.58
61.71	0	0.019	721.000	119.17	59.58	1.42	5.61
62.4	0	0.019	730.000	120.35	60.17	1.43	5.64
63.08	0	0.019	739.000	121.53	60.76	1.44	5.67
63.77	0	0.018	748.000	122.71	61.35	1.44	5.7
64.45	0	0.018	757.000	123.89	61.94	1.45	5.73
65.14	0	0.018	766.000	125.06	62.53	1.46	5.76
65.83	0	0.018	776.000	126.24	63.12	1.46	5.79
66.51	0	0.018	785.000	127.42	63.71	1.47	5.82
67.2	0	0.018	794.000	128.59	64.3	1.48	5.85
67.88	0	0.017	803.000	129.76	64.88	1.48	5.88
68.57	0	0.017	812.000	130.94	65.47	1.49	5.91
69.26	0	0.017	821.000	132.11	66.05	1.5	5.94
69.94	0	0.017	830.000	133.28	66.64	1.5	5.97
70.63	0	0.017	839.000	134.45	67.23	1.51	6
71.31	0	0.017	849.000	135.62	67.81	1.52	6.02
72	0	0.017	858.000	136.79	68.4	1.52	6.05
72.68	0	0.016	867.000	137.96	68.98	1.53	6.08
73.37	0	0.016	876.000	139.13	69.56	1.53	6.11
74.06	0	0.016	885.000	140.29	70.15	1.54	6.14
74.74	0	0.016	894.000	141.46	70.73	1.55	6.16
75.43	0	0.016	904.000	142.62	71.31	1.55	6.19
76.11	0	0.016	913.000	143.79	71.89	1.56	6.22
76.8	0	0.016	922.000	144.95	72.48	1.57	6.24
77.48	0	0.015	931.000	146.12	73.06	1.57	6.27
78.17	0	0.015	940.000	147.28	73.64	1.58	6.3
78.86	0	0.015	949.000	148.44	74.22	1.58	6.33
79.54	0	0.015	959.000	149.6	74.8	1.59	6.35
80.23	0	0.015	968.000	150.76	75.38	1.6	6.38
80.91	0	0.015	977.000	151.92	75.96	1.6	6.41
81.6	0	0.015	986.000	153.08	76.54	1.61	6.43
82.29	0	0.015	996.000	154.24	77.12	1.61	6.46
82.97	0	0.015	1000.000	155.4	77.7	1.62	6.48
83.66	0	0.014	1010.000	156.55	78.28	1.63	6.51
84.34	0	0.014	1020.000	157.71	78.85	1.63	6.54
85.03	0	0.014	1030.000	158.86	79.43	1.64	6.56
85.71	0	0.014	1040.000	160.02	80.01	1.64	6.59
86.4	0	0.014	1050.000	161.17	80.59	1.65	6.61
87.09	0	0.014	1060.000	162.33	81.16	1.66	6.64
87.77	0	0.014	1070.000	163.48	81.74	1.66	6.66

Copyright 2013 by Fluid Dynamix. Company Confidential.

88.46	0	0.014	1080.000	164.63	82.32	1.67	6.69
89.14	0	0.014	1090.000	165.79	82.89	1.67	6.71
89.83	0	0.014	1100.000	166.94	83.47	1.68	6.74
90.52	0	0.013	1110.000	168.09	84.04	1.68	6.76
91.2	0	0.013	1120.000	169.24	84.62	1.69	6.79
91.89	0	0.013	1120.000	170.39	85.2	1.7	6.81
92.57	0	0.013	1130.000	171.54	85.77	1.7	6.84
93.26	0	0.013	1140.000	172.69	86.34	1.71	6.86
93.94	0	0.013	1150.000	173.84	86.92	1.71	6.89
94.63	0	0.013	1160.000	174.98	87.49	1.72	6.91
95.32	0	0.013	1170.000	176.13	88.07	1.72	6.94
96	0	0.013	1180.000	177.28	88.64	1.73	6.96
96.69	0	0.013	1190.000	178.43	89.21	1.73	6.98
97.37	0	0.013	1200.000	179.57	89.79	1.74	7.01
98.06	0	0.013	1210.000	180.72	90.36	1.74	7.03
98.74	0	0.012	1220.000	181.86	90.93	1.75	7.06
99.43	0	0.012	1230.000	183	91.5	1.76	7.08
100.12	0	0.012	1240.000	184.15	92.07	1.76	7.1
100.8	0	0.012	1250.000	185.29	92.65	1.77	7.13
101.49	0	0.012	1260.000	186.43	93.22	1.77	7.15
102.17	0	0.012	1260.000	187.58	93.79	1.78	7.17
102.86	0	0.012	1270.000	188.72	94.36	1.78	7.2
103.55	0	0.012	1280.000	189.86	94.93	1.79	7.22
104.23	0	0.012	1290.000	191	95.5	1.79	7.24
104.92	0	0.012	1300.000	192.14	96.07	1.8	7.27
105.6	0	0.012	1310.000	193.28	96.64	1.8	7.29
106.29	0	0.012	1320.000	194.42	97.21	1.81	7.31
106.97	0	0.012	1330.000	195.56	97.78	1.81	7.33
107.66	0	0.011	1340.000	196.7	98.35	1.82	7.36
108.35	0	0.011	1350.000	197.84	98.92	1.82	7.38
109.03	0	0.011	1360.000	198.97	99.49	1.83	7.4
109.72	0	0.011	1370.000	200.11	100.06	1.83	7.43
110.4	0	0.011	1380.000	201.25	100.62	1.84	7.45
111.09	0	0.011	1390.000	202.38	101.19	1.84	7.47
111.77	0	0.011	1400.000	203.52	101.76	1.85	7.49
112.46	0	0.011	1400.000	204.66	102.33	1.85	7.51
113.15	0	0.011	1410.000	205.79	102.9	1.86	7.54
113.83	0	0.011	1420.000	206.93	103.46	1.86	7.56
114.52	0	0.011	1430.000	208.06	104.03	1.87	7.58
115.2	0	0.011	1440.000	209.19	104.6	1.87	7.6
115.89	0	0.011	1450.000	210.33	105.16	1.88	7.62
116.58	0	0.011	1460.000	211.46	105.73	1.88	7.65

Copyright 2013 by Fluid Dynamix. Company Confidential.

117.26	0	0.011	1470.000	212.59	106.3	1.89	7.67
117.95	0	0.011	1480.000	213.73	106.86	1.89	7.69
118.63	0	0.011	1490.000	214.86	107.43	1.9	7.71
119.32	0	0.01	1500.000	215.99	107.99	1.9	7.73
120	0	0.01	1510.000	217.12	108.56	1.91	7.75
120.69	0	0.01	1520.000	218.25	109.13	1.91	7.78
121.38	0	0.01	1530.000	219.38	109.69	1.92	7.8
122.06	0	0.01	1540.000	220.51	110.26	1.92	7.82
122.75	0	0.01	1550.000	221.64	110.82	1.93	7.84
123.43	0	0.01	1550.000	222.77	111.39	1.93	7.86
124.12	0	0.01	1560.000	223.9	111.95	1.94	7.88
124.81	0	0.01	1570.000	225.03	112.51	1.94	7.9
125.49	0	0.01	1580.000	226.16	113.08	1.95	7.92
126.18	0	0.01	1590.000	227.28	113.64	1.95	7.95
126.86	0	0.01	1600.000	228.41	114.21	1.96	7.97
127.55	0	0.01	1610.000	229.54	114.77	1.96	7.99
128.23	0	0.01	1620.000	230.67	115.33	1.97	8.01
128.92	0	0.01	1630.000	231.79	115.9	1.97	8.03
129.61	0	0.01	1640.000	232.92	116.46	1.98	8.05
130.29	0	0.01	1650.000	234.04	117.02	1.98	8.07
130.98	0	0.01	1660.000	235.17	117.58	1.99	8.09
131.66	0	0.01	1670.000	236.29	118.15	1.99	8.11
132.35	0	0.01	1680.000	237.42	118.71	1.99	8.13
133.03	0	0.009	1690.000	238.54	119.27	2	8.15
133.72	0	0.009	1700.000	239.67	119.83	2	8.17
134.41	0	0.009	1700.000	240.79	120.4	2.01	8.19
135.09	0	0.009	1710.000	241.92	120.96	2.01	8.21
135.78	0	0.009	1720.000	243.04	121.52	2.02	8.23
136.46	0	0.009	1730.000	244.16	122.08	2.02	8.25
137.15	0	0.009	1740.000	245.28	122.64	2.03	8.27
137.84	0	0.009	1750.000	246.41	123.2	2.03	8.29
138.52	0	0.009	1760.000	247.53	123.76	2.04	8.31
139.21	0	0.009	1770.000	248.65	124.32	2.04	8.33
139.89	0	0.009	1780.000	249.77	124.89	2.04	8.35
140.58	0	0.009	1790.000	250.89	125.45	2.05	8.37
141.26	0	0.009	1800.000	252.01	126.01	2.05	8.39
141.95	0	0.009	1810.000	253.13	126.57	2.06	8.41
142.64	0	0.009	1820.000	254.25	127.13	2.06	8.43
143.32	0	0.009	1830.000	255.37	127.69	2.07	8.45
144.01	0	0.009	1840.000	256.49	128.25	2.07	8.47
144.69	0	0.009	1850.000	257.61	128.81	2.08	8.49
145.38	0	0.009	1860.000	258.73	129.37	2.08	8.51

Copyright 2013 by Fluid Dynamix. Company Confidential.

146.06	0	0.009	1870.000	259.85	129.92	2.08	8.53
146.75	0	0.009	1870.000	260.97	130.48	2.09	8.55
147.44	0	0.009	1880.000	262.09	131.04	2.09	8.57
148.12	0	0.009	1890.000	263.2	131.6	2.1	8.59
148.81	0	0.009	1900.000	264.32	132.16	2.1	8.61
149.49	0	0.009	1910.000	265.44	132.72	2.11	8.63
150.18	0	0.008	1920.000	266.55	133.28	2.11	8.65
150.87	0	0.008	1930.000	267.67	133.84	2.12	8.66
151.55	0	0.008	1940.000	268.79	134.39	2.12	8.68
152.24	0	0.008	1950.000	269.9	134.95	2.12	8.7
152.92	0	0.008	1960.000	271.02	135.51	2.13	8.72
153.61	0	0.008	1970.000	272.13	136.07	2.13	8.74
154.29	0	0.008	1980.000	273.25	136.62	2.14	8.76
154.98	0	0.008	1990.000	274.36	137.18	2.14	8.78
155.67	0	0.008	2000.000	275.48	137.74	2.15	8.8
156.35	0	0.008	2010.000	276.59	138.3	2.15	8.82
157.04	0	0.008	2020.000	277.71	138.85	2.15	8.83
157.72	0	0.008	2030.000	278.82	139.41	2.16	8.85
158.41	0	0.008	2040.000	279.94	139.97	2.16	8.87
159.1	0	0.008	2050.000	281.05	140.52	2.17	8.89
159.78	0	0.008	2050.000	282.16	141.08	2.17	8.91
160.47	0	0.008	2060.000	283.28	141.64	2.17	8.93
161.15	0	0.008	2070.000	284.39	142.19	2.18	8.95
161.84	0	0.008	2080.000	285.5	142.75	2.18	8.96
162.52	0	0.008	2090.000	286.61	143.31	2.19	8.98
163.21	0	0.008	2100.000	287.72	143.86	2.19	9
163.9	0	0.008	2110.000	288.84	144.42	2.2	9.02
164.58	0	0.008	2120.000	289.95	144.97	2.2	9.04
165.27	0	0.008	2130.000	291.06	145.53	2.2	9.06
165.95	0	0.008	2140.000	292.17	146.08	2.21	9.07
166.64	0	0.008	2150.000	293.28	146.64	2.21	9.09
167.32	0	0.008	2160.000	294.39	147.2	2.22	9.11
168.01	0	0.008	2170.000	295.5	147.75	2.22	9.13
168.7	0	0.008	2180.000	296.61	148.31	2.22	9.15
169.38	0	0.008	2190.000	297.72	148.86	2.23	9.16
170.07	0	0.008	2200.000	298.83	149.42	2.23	9.18
170.75	0	0.008	2210.000	299.94	149.97	2.24	9.2
171.44	0	0.008	2220.000	301.05	150.52	2.24	9.22
172.13	0	0.007	2230.000	302.16	151.08	2.24	9.24
172.81	0	0.007	2230.000	303.27	151.63	2.25	9.25
173.5	0	0.007	2240.000	304.37	152.19	2.25	9.27
174.18	0	0.007	2250.000	305.48	152.74	2.26	9.29

Copyright 2013 by Fluid Dynamix. Company Confidential.

174.87	0	0.007	2260.000	306.59	153.3	2.26	9.31
175.55	0	0.007	2270.000	307.7	153.85	2.26	9.32
176.24	0	0.007	2280.000	308.81	154.4	2.27	9.34
176.93	0	0.007	2290.000	309.91	154.96	2.27	9.36
177.61	0	0.007	2300.000	311.02	155.51	2.28	9.38
178.3	0	0.007	2310.000	312.13	156.06	2.28	9.4
178.98	0	0.007	2320.000	313.23	156.62	2.28	9.41
179.67	0	0.007	2330.000	314.34	157.17	2.29	9.43
180.35	0	0.007	2340.000	315.45	157.72	2.29	9.45
181.04	0	0.007	2350.000	316.55	158.28	2.3	9.46
181.73	0	0.007	2360.000	317.66	158.83	2.3	9.48
182.41	0	0.007	2370.000	318.76	159.38	2.3	9.5
183.1	0	0.007	2380.000	319.87	159.93	2.31	9.52
183.78	0	0.007	2390.000	320.97	160.49	2.31	9.53
184.47	0	0.007	2400.000	322.08	161.04	2.32	9.55
185.16	0	0.007	2410.000	323.18	161.59	2.32	9.57
185.84	0	0.007	2420.000	324.29	162.14	2.32	9.59
186.53	0	0.007	2420.000	325.39	162.7	2.33	9.6
187.21	0	0.007	2430.000	326.5	163.25	2.33	9.62
187.9	0	0.007	2440.000	327.6	163.8	2.33	9.64
188.58	0	0.007	2450.000	328.7	164.35	2.34	9.65
189.27	0	0.007	2460.000	329.81	164.9	2.34	9.67
189.96	0	0.007	2470.000	330.91	165.46	2.35	9.69
190.64	0	0.007	2480.000	332.01	166.01	2.35	9.7
191.33	0	0.007	2490.000	333.12	166.56	2.35	9.72
192.01	0	0.007	2500.000	334.22	167.11	2.36	9.74
192.7	0	0.007	2510.000	335.32	167.66	2.36	9.76
193.39	0	0.007	2520.000	336.42	168.21	2.37	9.77
194.07	0	0.007	2530.000	337.53	168.76	2.37	9.79
194.76	0	0.007	2540.000	338.63	169.31	2.37	9.81
195.44	0	0.007	2550.000	339.73	169.86	2.38	9.82
196.13	0	0.007	2560.000	340.83	170.42	2.38	9.84
196.81	0	0.007	2570.000	341.93	170.97	2.38	9.86
197.5	0	0.007	2580.000	343.03	171.52	2.39	9.87
198.19	0	0.007	2590.000	344.13	172.07	2.39	9.89
198.87	0	0.007	2600.000	345.24	172.62	2.4	9.91
199.56	0	0.007	2610.000	346.34	173.17	2.4	9.92
200.24	0	0.007	2620.000	347.44	173.72	2.4	9.94
200.93	0	0.006	2620.000	348.54	174.27	2.41	9.96
201.61	0	0.006	2630.000	349.64	174.82	2.41	9.97
202.3	0	0.006	2640.000	350.74	175.37	2.41	9.99
202.99	0	0.006	2650.000	351.84	175.92	2.42	10

Copyright 2013 by Fluid Dynamix. Company Confidential.

203.67	0	0.006	2660.000	352.94	176.47	2.42	10.02
204.36	0	0.006	2670.000	354.03	177.02	2.43	10.04
205.04	0	0.006	2680.000	355.13	177.57	2.43	10.05
205.73	0	0.006	2690.000	356.23	178.12	2.43	10.07
206.42	0	0.006	2700.000	357.33	178.67	2.44	10.09
207.1	0	0.006	2710.000	358.43	179.22	2.44	10.1
207.79	0	0.006	2720.000	359.53	179.76	2.44	10.12
208.47	0	0.006	2730.000	360.63	180.31	2.45	10.13
209.16	0	0.006	2740.000	361.73	180.86	2.45	10.15
209.84	0	0.006	2750.000	362.82	181.41	2.45	10.17
210.53	0	0.006	2760.000	363.92	181.96	2.46	10.18
211.22	0	0.006	2770.000	365.02	182.51	2.46	10.2
211.9	0	0.006	2780.000	366.12	183.06	2.47	10.22
212.59	0	0.006	2790.000	367.21	183.61	2.47	10.23
213.27	0	0.006	2800.000	368.31	184.15	2.47	10.25
213.96	0	0.006	2810.000	369.41	184.7	2.48	10.26
214.64	0	0.006	2820.000	370.5	185.25	2.48	10.28
215.33	0	0.006	2830.000	371.6	185.8	2.48	10.3
216.02	0	0.006	2830.000	372.7	186.35	2.49	10.31
216.7	0	0.006	2840.000	373.79	186.9	2.49	10.33
217.39	0	0.006	2850.000	374.89	187.44	2.49	10.34
218.07	0	0.006	2860.000	375.98	187.99	2.5	10.36
218.76	0	0.006	2870.000	377.08	188.54	2.5	10.37
219.45	0	0.006	2880.000	378.18	189.09	2.5	10.39
220.13	0	0.006	2890.000	379.27	189.64	2.51	10.41
220.82	0	0.006	2900.000	380.37	190.18	2.51	10.42
221.5	0	0.006	2910.000	381.46	190.73	2.52	10.44
222.19	0	0.006	2920.000	382.56	191.28	2.52	10.45
222.87	0	0.006	2930.000	383.65	191.83	2.52	10.47
223.56	0	0.006	2940.000	384.75	192.37	2.53	10.48
224.25	0	0.006	2950.000	385.84	192.92	2.53	10.5
224.93	0	0.006	2960.000	386.93	193.47	2.53	10.52
225.62	0	0.006	2970.000	388.03	194.01	2.54	10.53
226.3	0	0.006	2980.000	389.12	194.56	2.54	10.55
226.99	0	0.006	2990.000	390.22	195.11	2.54	10.56
227.68	0	0.006	3000.000	391.31	195.66	2.55	10.58
228.36	0	0.006	3010.000	392.4	196.2	2.55	10.59
229.05	0	0.006	3020.000	393.5	196.75	2.55	10.61
229.73	0	0.006	3030.000	394.59	197.3	2.56	10.62
230.42	0	0.006	3040.000	395.68	197.84	2.56	10.64
231.1	0	0.006	3040.000	396.78	198.39	2.56	10.65
231.79	0	0.006	3050.000	397.87	198.93	2.57	10.67

Copyright 2013 by Fluid Dynamix. Company Confidential.

232.48	0	0.006	3060.000	398.96	199.48	2.57	10.68
233.16	0	0.006	3070.000	400.05	200.03	2.57	10.7
233.85	0	0.006	3080.000	401.15	200.57	2.58	10.72
234.53	0	0.006	3090.000	402.24	201.12	2.58	10.73
235.22	0	0.006	3100.000	403.33	201.67	2.59	10.75
235.9	0	0.006	3110.000	404.42	202.21	2.59	10.76
236.59	0	0.006	3120.000	405.51	202.76	2.59	10.78

EXC. TEMP. (DEG. C)	AREA (SQ. M)
0.06	23.200
0.11	6.100
0.17	2.590
0.22	1.330
0.28	0.788
0.33	0.478
0.39	0.315
0.45	0.208
0.5	0.146
0.56	0.100
0.61	0.069
0.67	0.049
0.72	0.034
0.78	0.023
0.84	0.016
0.89	0.010
0.95	0.006
1	0.004
1.06	0.002
1.12	0.001

APPENDIX C: MODEL INPUT DATA - HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE**TABLE C.1****MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE EFFLUENT VOLUME DISCHARGED
HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE**

1.0 24 bbl/d TS series.flo

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

4760.0

ED_000659_PST2_00002237

EPA_FOIA-2016-000092-00972

TABLE C.2

**VISUAL PLUMES MODEL TEXT OUTPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
HYDRAULIC UNIT, COMPRESSOR CHILLER AND RIG BRAKE**

VISUAL PLUMES MODEL TEXT OUTPUT PDS FILE CONTENTS ARE LISTED BELOW

```
PDSWIN -      FLOATING      WARM   WATER   JETS   --
AMBENT       CONDITIONS    :      TEMP.   TA=    4      DEG.    C
VEL.        0.07        M/S
HEAT        CONVECTION   =      1

DISCHARGE    CONDITIONS    :      TEMP.   =      4.2    C;
DEPTH       = 0.09        M.     ;      WIDTH   =      0.09    M.
ANGLE        0           DEG.   ;      DISCHARGE   RATE   =      0.01    CU-M/S
DISCHARGE    DENSIMENTRIC FROUDE NO. 1106600.88
```

X(M.)	Y(M.)	EX.TEMP (DEG. C)	TIME (SEC.)	Q/Q0 (DILU.)	QM/Q0	DEPTH(M.)	WIDTH(M.)
0.01	0	0.215	0.00	2	1	0.14	0.14
0.01	0	0.21	0.01	2.05	1.02	0.14	0.15
0.02	0	0.205	0.02	2.1	1.05	0.14	0.15
0.03	0	0.2	0.03	2.15	1.07	0.14	0.16
0.03	0	0.196	0.03	2.19	1.1	0.14	0.17
0.04	0	0.192	0.04	2.24	1.12	0.14	0.17
0.05	0	0.188	0.05	2.28	1.14	0.14	0.18
0.06	0	0.181	0.06	2.37	1.19	0.15	0.19
0.08	0	0.175	0.08	2.46	1.23	0.15	0.2
0.09	0	0.169	0.10	2.54	1.27	0.15	0.21
0.11	0	0.164	0.11	2.62	1.31	0.15	0.22
0.13	0	0.155	0.15	2.78	1.39	0.16	0.24
0.16	0	0.147	0.19	2.93	1.47	0.16	0.26
0.19	0	0.139	0.23	3.08	1.54	0.16	0.27
0.22	0	0.133	0.27	3.23	1.62	0.17	0.29
0.28	0	0.122	0.36	3.52	1.76	0.17	0.33
0.33	0	0.113	0.45	3.79	1.9	0.18	0.36
0.39	0	0.106	0.55	4.06	2.03	0.19	0.39
0.45	0	0.099	0.66	4.32	2.16	0.19	0.42
0.56	0	0.089	0.89	4.84	2.42	0.21	0.48
0.68	0	0.081	1.14	5.34	2.67	0.22	0.54
0.79	0	0.074	1.41	5.84	2.92	0.23	0.59
0.91	0	0.068	1.70	6.33	3.16	0.24	0.64
1.13	0	0.06	2.34	7.28	3.64	0.27	0.74
1.36	0	0.053	3.05	8.22	4.11	0.29	0.83

Copyright 2013 by Fluid Dynamix. Company Confidential.

1.59	0	0.048	3.82	9.14	4.57	0.31	0.92
1.82	0	0.043	4.66	10.06	5.03	0.33	1
2.05	0	0.04	5.55	10.96	5.48	0.35	1.08
2.28	0	0.037	6.49	11.85	5.93	0.37	1.16
2.73	0	0.032	8.53	13.61	6.81	0.41	1.3
3.19	0	0.028	10.80	15.35	7.67	0.44	1.44
3.65	0	0.026	13.20	17.06	8.53	0.48	1.57
4.11	0	0.023	15.70	18.75	9.37	0.51	1.69
4.56	0	0.021	18.40	20.42	10.21	0.54	1.8
5.02	0	0.02	21.20	22.07	11.04	0.56	1.91
5.48	0	0.018	24.20	23.71	11.85	0.59	2.01
5.93	0	0.017	27.20	25.33	12.67	0.62	2.11
6.39	0	0.016	30.40	26.94	13.47	0.64	2.21
6.85	0	0.015	33.60	28.54	14.27	0.66	2.3
7.31	0	0.015	37.00	30.12	15.06	0.69	2.39
7.76	0	0.014	40.40	31.7	15.85	0.71	2.47
8.22	0	0.013	43.90	33.26	16.63	0.73	2.56
8.68	0	0.013	47.50	34.82	17.41	0.75	2.64
9.13	0	0.012	51.10	36.36	18.18	0.77	2.72
9.59	0	0.012	54.90	37.9	18.95	0.79	2.79
10.05	0	0.011	58.70	39.43	19.71	0.81	2.87
10.51	0	0.011	62.50	40.95	20.47	0.83	2.94
10.96	0	0.01	66.40	42.46	21.23	0.85	3.01
11.42	0	0.01	70.40	43.97	21.98	0.86	3.08
11.88	0	0.01	74.40	45.47	22.73	0.88	3.15
12.34	0	0.009	78.50	46.96	23.48	0.9	3.22
12.79	0	0.009	82.60	48.45	24.22	0.91	3.28
13.25	0	0.009	86.80	49.93	24.96	0.93	3.35
13.71	0	0.009	91.00	51.4	25.7	0.94	3.41
14.16	0	0.008	95.20	52.87	26.44	0.96	3.47
14.62	0	0.008	99.50	54.34	27.17	0.97	3.53
15.08	0	0.008	104.00	55.8	27.9	0.99	3.59
15.54	0	0.008	108.00	57.25	28.63	1	3.65
15.99	0	0.007	113.00	58.7	29.35	1.02	3.71
16.45	0	0.007	117.00	60.15	30.07	1.03	3.77
16.91	0	0.007	122.00	61.59	30.79	1.05	3.82
17.36	0	0.007	126.00	63.02	31.51	1.06	3.88
17.82	0	0.007	131.00	64.46	32.23	1.07	3.93
18.28	0	0.007	135.00	65.88	32.94	1.09	3.98
18.74	0	0.006	140.00	67.31	33.65	1.1	4.04
19.19	0	0.006	144.00	68.73	34.36	1.11	4.09
19.65	0	0.006	149.00	70.14	35.07	1.13	4.14

Copyright 2013 by Fluid Dynamix. Company Confidential.

20.11	0	0.006	154.00	71.56	35.78	1.14	4.19
20.56	0	0.006	158.00	72.97	36.48	1.15	4.24
21.02	0	0.006	163.00	74.37	37.19	1.16	4.29
21.48	0	0.006	168.00	75.77	37.89	1.17	4.34
21.94	0	0.006	173.00	77.17	38.59	1.19	4.39
22.39	0	0.006	178.00	78.57	39.28	1.2	4.44
22.85	0	0.005	182.00	79.96	39.98	1.21	4.48
23.31	0	0.005	187.00	81.35	40.68	1.22	4.53
23.77	0	0.005	192.00	82.74	41.37	1.23	4.58
24.22	0	0.005	197.00	84.12	42.06	1.24	4.62
24.68	0	0.005	202.00	85.5	42.75	1.25	4.67
25.14	0	0.005	207.00	86.88	43.44	1.27	4.71
25.59	0	0.005	212.00	88.26	44.13	1.28	4.76
26.05	0	0.005	217.00	89.63	44.82	1.29	4.8
26.51	0	0.005	222.00	91	45.5	1.3	4.84
26.97	0	0.005	227.00	92.37	46.18	1.31	4.89
27.42	0	0.005	232.00	93.73	46.87	1.32	4.93
27.88	0	0.005	237.00	95.1	47.55	1.33	4.97
28.34	0	0.005	242.00	96.46	48.23	1.34	5.01
28.79	0	0.004	247.00	97.82	48.91	1.35	5.06
29.25	0	0.004	252.00	99.17	49.59	1.36	5.1
29.71	0	0.004	257.00	100.53	50.26	1.37	5.14
30.17	0	0.004	262.00	101.88	50.94	1.38	5.18
30.62	0	0.004	267.00	103.23	51.61	1.39	5.22
31.08	0	0.004	273.00	104.58	52.29	1.4	5.26
31.54	0	0.004	278.00	105.92	52.96	1.41	5.3
31.99	0	0.004	283.00	107.27	53.63	1.42	5.34
32.45	0	0.004	288.00	108.61	54.3	1.43	5.38
32.91	0	0.004	293.00	109.95	54.97	1.44	5.41
33.37	0	0.004	299.00	111.28	55.64	1.44	5.45
33.82	0	0.004	304.00	112.62	56.31	1.45	5.49
34.28	0	0.004	309.00	113.95	56.98	1.46	5.53
34.74	0	0.004	314.00	115.29	57.64	1.47	5.57
35.2	0	0.004	320.00	116.62	58.31	1.48	5.6
35.65	0	0.004	325.00	117.95	58.97	1.49	5.64
36.11	0	0.004	330.00	119.27	59.64	1.5	5.68
36.57	0	0.004	335.00	120.6	60.3	1.51	5.71
37.02	0	0.004	341.00	121.92	60.96	1.52	5.75
37.48	0	0.004	346.00	123.24	61.62	1.52	5.79
37.94	0	0.004	351.00	124.56	62.28	1.53	5.82
38.4	0	0.003	357.00	125.88	62.94	1.54	5.86
38.85	0	0.003	362.00	127.2	63.6	1.55	5.89

Copyright 2013 by Fluid Dynamix. Company Confidential.

39.31	0	0.003	367.00	128.51	64.26	1.56	5.93
39.77	0	0.003	373.00	129.83	64.91	1.57	5.96
40.22	0	0.003	378.00	131.14	65.57	1.57	6
40.68	0	0.003	384.00	132.45	66.23	1.58	6.03
41.14	0	0.003	389.00	133.76	66.88	1.59	6.06
41.6	0	0.003	394.00	135.07	67.53	1.6	6.1
42.05	0	0.003	400.00	136.38	68.19	1.61	6.13
42.51	0	0.003	405.00	137.68	68.84	1.62	6.16
42.97	0	0.003	411.00	138.99	69.49	1.62	6.2
43.42	0	0.003	416.00	140.29	70.14	1.63	6.23
43.88	0	0.003	422.00	141.59	70.79	1.64	6.26
44.34	0	0.003	427.00	142.89	71.44	1.65	6.3
44.8	0	0.003	432.00	144.19	72.09	1.65	6.33
45.25	0	0.003	438.00	145.48	72.74	1.66	6.36
45.71	0	0.003	443.00	146.78	73.39	1.67	6.39
46.17	0	0.003	449.00	148.08	74.04	1.68	6.43
46.63	0	0.003	454.00	149.37	74.68	1.69	6.46
47.08	0	0.003	460.00	150.66	75.33	1.69	6.49
47.54	0	0.003	465.00	151.95	75.98	1.7	6.52
48	0	0.003	471.00	153.24	76.62	1.71	6.55
48.45	0	0.003	476.00	154.53	77.27	1.71	6.58
48.91	0	0.003	482.00	155.82	77.91	1.72	6.61
49.37	0	0.003	488.00	157.1	78.55	1.73	6.64
49.83	0	0.003	493.00	158.39	79.2	1.74	6.68
50.28	0	0.003	499.00	159.67	79.84	1.74	6.71
50.74	0	0.003	504.00	160.96	80.48	1.75	6.74
51.2	0	0.003	510.00	162.24	81.12	1.76	6.77
51.65	0	0.003	515.00	163.52	81.76	1.77	6.8
52.11	0	0.003	521.00	164.8	82.4	1.77	6.83
52.57	0	0.003	527.00	166.08	83.04	1.78	6.86
53.03	0	0.003	532.00	167.36	83.68	1.79	6.89
53.48	0	0.003	538.00	168.63	84.32	1.79	6.92
53.94	0	0.003	543.00	169.91	84.95	1.8	6.94
54.4	0	0.003	549.00	171.18	85.59	1.81	6.97
54.85	0	0.003	555.00	172.46	86.23	1.81	7
55.31	0	0.003	560.00	173.73	86.86	1.82	7.03
55.77	0	0.002	566.00	175	87.5	1.83	7.06
56.23	0	0.002	571.00	176.27	88.14	1.84	7.09
56.68	0	0.002	577.00	177.54	88.77	1.84	7.12
57.14	0	0.002	583.00	178.81	89.4	1.85	7.15
57.6	0	0.002	588.00	180.08	90.04	1.86	7.18
58.06	0	0.002	594.00	181.34	90.67	1.86	7.2

Copyright 2013 by Fluid Dynamix. Company Confidential.

58.51	0	0.002	600.00	182.61	91.31	1.87	7.23
58.97	0	0.002	605.00	183.88	91.94	1.88	7.26
59.43	0	0.002	611.00	185.14	92.57	1.88	7.29
59.88	0	0.002	617.00	186.4	93.2	1.89	7.31
60.34	0	0.002	622.00	187.67	93.83	1.89	7.34
60.8	0	0.002	628.00	188.93	94.46	1.9	7.37
61.26	0	0.002	634.00	190.19	95.09	1.91	7.4
61.71	0	0.002	639.00	191.45	95.72	1.91	7.42
62.17	0	0.002	645.00	192.71	96.35	1.92	7.45
62.63	0	0.002	651.00	193.96	96.98	1.93	7.48
63.08	0	0.002	657.00	195.22	97.61	1.93	7.51
63.54	0	0.002	662.00	196.48	98.24	1.94	7.53
64	0	0.002	668.00	197.73	98.87	1.95	7.56
64.46	0	0.002	674.00	198.99	99.49	1.95	7.59
64.91	0	0.002	679.00	200.24	100.12	1.96	7.61
65.37	0	0.002	685.00	201.5	100.75	1.96	7.64
65.83	0	0.002	691.00	202.75	101.37	1.97	7.67
66.28	0	0.002	697.00	204	102	1.98	7.69
66.74	0	0.002	702.00	205.25	102.63	1.98	7.72
67.2	0	0.002	708.00	206.5	103.25	1.99	7.74
67.66	0	0.002	714.00	207.75	103.88	2	7.77
68.11	0	0.002	720.00	209	104.5	2	7.8
68.57	0	0.002	725.00	210.25	105.12	2.01	7.82
69.03	0	0.002	731.00	211.5	105.75	2.01	7.85
69.49	0	0.002	737.00	212.74	106.37	2.02	7.87
69.94	0	0.002	743.00	213.99	106.99	2.03	7.9
70.4	0	0.002	749.00	215.23	107.62	2.03	7.92
70.86	0	0.002	754.00	216.48	108.24	2.04	7.95
71.31	0	0.002	760.00	217.72	108.86	2.04	7.97
71.77	0	0.002	766.00	218.96	109.48	2.05	8
72.23	0	0.002	772.00	220.21	110.1	2.06	8.02
72.69	0	0.002	778.00	221.45	110.72	2.06	8.05
73.14	0	0.002	783.00	222.69	111.34	2.07	8.07
73.6	0	0.002	789.00	223.93	111.96	2.07	8.1
74.06	0	0.002	795.00	225.17	112.58	2.08	8.12
74.51	0	0.002	801.00	226.41	113.2	2.08	8.15
74.97	0	0.002	807.00	227.64	113.82	2.09	8.17
75.43	0	0.002	812.00	228.88	114.44	2.1	8.2
75.89	0	0.002	818.00	230.12	115.06	2.1	8.22
76.34	0	0.002	824.00	231.36	115.68	2.11	8.25
76.8	0	0.002	830.00	232.59	116.3	2.11	8.27
77.26	0	0.002	836.00	233.83	116.91	2.12	8.29

Copyright 2013 by Fluid Dynamix. Company Confidential.

77.71	0	0.002	842.00	235.06	117.53	2.12	8.32
78.17	0	0.002	847.00	236.29	118.15	2.13	8.34
78.63	0	0.002	853.00	237.53	118.76	2.14	8.37
79.09	0	0.002	859.00	238.76	119.38	2.14	8.39
79.54	0	0.002	865.00	239.99	120	2.15	8.41
80	0	0.002	871.00	241.22	120.61	2.15	8.44
80.46	0	0.002	877.00	242.45	121.23	2.16	8.46
80.92	0	0.002	882.00	243.68	121.84	2.16	8.49
81.37	0	0.002	888.00	244.91	122.46	2.17	8.51
81.83	0	0.002	894.00	246.14	123.07	2.17	8.53
82.29	0	0.002	900.00	247.37	123.69	2.18	8.56
82.74	0	0.002	906.00	248.6	124.3	2.19	8.58
83.2	0	0.002	912.00	249.83	124.91	2.19	8.6
83.66	0	0.002	918.00	251.05	125.53	2.2	8.63
84.12	0	0.002	924.00	252.28	126.14	2.2	8.65
84.57	0	0.002	929.00	253.5	126.75	2.21	8.67
85.03	0	0.002	935.00	254.73	127.36	2.21	8.69
85.49	0	0.002	941.00	255.95	127.98	2.22	8.72
85.94	0	0.002	947.00	257.18	128.59	2.22	8.74
86.4	0	0.002	953.00	258.4	129.2	2.23	8.76
86.86	0	0.002	959.00	259.62	129.81	2.23	8.79
87.32	0	0.002	965.00	260.85	130.42	2.24	8.81
87.77	0	0.002	971.00	262.07	131.03	2.24	8.83
88.23	0	0.002	977.00	263.29	131.64	2.25	8.85
88.69	0	0.002	983.00	264.51	132.25	2.25	8.88
89.14	0	0.002	988.00	265.73	132.87	2.26	8.9
89.6	0	0.002	994.00	266.95	133.47	2.27	8.92
90.06	0	0.002	1000.00	268.17	134.08	2.27	8.94
90.52	0	0.002	1010.00	269.39	134.69	2.28	8.96
90.97	0	0.002	1010.00	270.61	135.3	2.28	8.99
91.43	0	0.002	1020.00	271.82	135.91	2.29	9.01
91.89	0	0.002	1020.00	273.04	136.52	2.29	9.03
92.35	0	0.002	1030.00	274.26	137.13	2.3	9.05
92.8	0	0.002	1040.00	275.47	137.74	2.3	9.07
93.26	0	0.002	1040.00	276.69	138.34	2.31	9.1
93.72	0	0.002	1050.00	277.9	138.95	2.31	9.12
94.17	0	0.002	1050.00	279.12	139.56	2.32	9.14
94.63	0	0.002	1060.00	280.33	140.17	2.32	9.16
95.09	0	0.002	1070.00	281.55	140.77	2.33	9.18
95.55	0	0.002	1070.00	282.76	141.38	2.33	9.21
96	0	0.002	1080.00	283.97	141.99	2.34	9.23
96.46	0	0.002	1080.00	285.19	142.59	2.34	9.25

Copyright 2013 by Fluid Dynamix. Company Confidential.

96.92	0	0.002	1090.00	286.4	143.2	2.35	9.27
97.37	0	0.002	1100.00	287.61	143.8	2.35	9.29
97.83	0	0.002	1100.00	288.82	144.41	2.36	9.31
98.29	0	0.002	1110.00	290.03	145.01	2.36	9.33
98.75	0	0.001	1110.00	291.24	145.62	2.37	9.35
99.2	0	0.001	1120.00	292.45	146.22	2.37	9.38
99.66	0	0.001	1130.00	293.66	146.83	2.38	9.4
100.12	0	0.001	1130.00	294.87	147.43	2.38	9.42
100.57	0	0.001	1140.00	296.08	148.04	2.39	9.44
101.03	0	0.001	1140.00	297.28	148.64	2.39	9.46
101.49	0	0.001	1150.00	298.49	149.25	2.4	9.48
101.95	0	0.001	1150.00	299.7	149.85	2.4	9.5
102.4	0	0.001	1160.00	300.9	150.45	2.41	9.52
102.86	0	0.001	1170.00	302.11	151.06	2.41	9.54
103.32	0	0.001	1170.00	303.32	151.66	2.42	9.56
103.78	0	0.001	1180.00	304.52	152.26	2.42	9.58
104.23	0	0.001	1180.00	305.73	152.86	2.42	9.6
104.69	0	0.001	1190.00	306.93	153.47	2.43	9.63
105.15	0	0.001	1200.00	308.13	154.07	2.43	9.65
105.6	0	0.001	1200.00	309.34	154.67	2.44	9.67
106.06	0	0.001	1210.00	310.54	155.27	2.44	9.69
106.52	0	0.001	1210.00	311.74	155.87	2.45	9.71
106.98	0	0.001	1220.00	312.95	156.47	2.45	9.73
107.43	0	0.001	1230.00	314.15	157.07	2.46	9.75
107.89	0	0.001	1230.00	315.35	157.67	2.46	9.77
108.35	0	0.001	1240.00	316.55	158.28	2.47	9.79
108.8	0	0.001	1240.00	317.75	158.88	2.47	9.81
109.26	0	0.001	1250.00	318.95	159.48	2.48	9.83
109.72	0	0.001	1260.00	320.15	160.08	2.48	9.85
110.18	0	0.001	1260.00	321.35	160.68	2.49	9.87
110.63	0	0.001	1270.00	322.55	161.28	2.49	9.89
111.09	0	0.001	1270.00	323.75	161.87	2.5	9.91
111.55	0	0.001	1280.00	324.95	162.47	2.5	9.93
112	0	0.001	1290.00	326.15	163.07	2.5	9.95
112.46	0	0.001	1290.00	327.34	163.67	2.51	9.97
112.92	0	0.001	1300.00	328.54	164.27	2.51	9.99
113.38	0	0.001	1300.00	329.74	164.87	2.52	10.01
113.83	0	0.001	1310.00	330.93	165.47	2.52	10.03
114.29	0	0.001	1320.00	332.13	166.07	2.53	10.05
114.75	0	0.001	1320.00	333.33	166.66	2.53	10.07
115.21	0	0.001	1330.00	334.52	167.26	2.54	10.09
115.66	0	0.001	1330.00	335.72	167.86	2.54	10.1

Copyright 2013 by Fluid Dynamix. Company Confidential.

116.12	0	0.001	1340.00	336.91	168.46	2.55	10.12
116.58	0	0.001	1350.00	338.11	169.05	2.55	10.14
117.03	0	0.001	1350.00	339.3	169.65	2.55	10.16
117.49	0	0.001	1360.00	340.49	170.25	2.56	10.18
117.95	0	0.001	1370.00	341.69	170.84	2.56	10.2
118.41	0	0.001	1370.00	342.88	171.44	2.57	10.22
118.86	0	0.001	1380.00	344.07	172.04	2.57	10.24
119.32	0	0.001	1380.00	345.26	172.63	2.58	10.26
119.78	0	0.001	1390.00	346.46	173.23	2.58	10.28
120.23	0	0.001	1400.00	347.65	173.82	2.59	10.3
120.69	0	0.001	1400.00	348.84	174.42	2.59	10.32
121.15	0	0.001	1410.00	350.03	175.02	2.59	10.34
121.61	0	0.001	1410.00	351.22	175.61	2.6	10.35
122.06	0	0.001	1420.00	352.41	176.21	2.6	10.37
122.52	0	0.001	1430.00	353.6	176.8	2.61	10.39
122.98	0	0.001	1430.00	354.79	177.4	2.61	10.41
123.43	0	0.001	1440.00	355.98	177.99	2.62	10.43
123.89	0	0.001	1440.00	357.17	178.58	2.62	10.45
124.35	0	0.001	1450.00	358.36	179.18	2.62	10.47
124.81	0	0.001	1460.00	359.55	179.77	2.63	10.49
125.26	0	0.001	1460.00	360.73	180.37	2.63	10.5
125.72	0	0.001	1470.00	361.92	180.96	2.64	10.52
126.18	0	0.001	1470.00	363.11	181.55	2.64	10.54
126.64	0	0.001	1480.00	364.29	182.15	2.65	10.56
127.09	0	0.001	1490.00	365.48	182.74	2.65	10.58
127.55	0	0.001	1490.00	366.67	183.33	2.66	10.6
128.01	0	0.001	1500.00	367.85	183.93	2.66	10.62
128.46	0	0.001	1500.00	369.04	184.52	2.66	10.63
128.92	0	0.001	1510.00	370.22	185.11	2.67	10.65
129.38	0	0.001	1520.00	371.41	185.7	2.67	10.67
129.84	0	0.001	1520.00	372.59	186.3	2.68	10.69
130.29	0	0.001	1530.00	373.78	186.89	2.68	10.71
130.75	0	0.001	1530.00	374.96	187.48	2.68	10.73
131.21	0	0.001	1540.00	376.15	188.07	2.69	10.74
131.66	0	0.001	1550.00	377.33	188.67	2.69	10.76
132.12	0	0.001	1550.00	378.51	189.26	2.7	10.78
132.58	0	0.001	1560.00	379.7	189.85	2.7	10.8
133.04	0	0.001	1570.00	380.88	190.44	2.71	10.82
133.49	0	0.001	1570.00	382.06	191.03	2.71	10.83
133.95	0	0.001	1580.00	383.24	191.62	2.71	10.85
134.41	0	0.001	1580.00	384.42	192.21	2.72	10.87
134.86	0	0.001	1590.00	385.61	192.8	2.72	10.89

Copyright 2013 by Fluid Dynamix. Company Confidential.

135.32	0	0.001	1600.00	386.79	193.39	2.73	10.91
135.78	0	0.001	1600.00	387.97	193.98	2.73	10.92
136.24	0	0.001	1610.00	389.15	194.57	2.73	10.94
136.69	0	0.001	1610.00	390.33	195.16	2.74	10.96
137.15	0	0.001	1620.00	391.51	195.75	2.74	10.98
137.61	0	0.001	1630.00	392.69	196.34	2.75	11
138.07	0	0.001	1630.00	393.87	196.93	2.75	11.01
138.52	0	0.001	1640.00	395.05	197.52	2.76	11.03
138.98	0	0.001	1640.00	396.23	198.11	2.76	11.05
139.44	0	0.001	1650.00	397.4	198.7	2.76	11.07
139.89	0	0.001	1660.00	398.58	199.29	2.77	11.08
140.35	0	0.001	1660.00	399.76	199.88	2.77	11.1
140.81	0	0.001	1670.00	400.94	200.47	2.78	11.12
141.27	0	0.001	1670.00	402.12	201.06	2.78	11.14
141.72	0	0.001	1680.00	403.29	201.65	2.78	11.15
142.18	0	0.001	1690.00	404.47	202.23	2.79	11.17
142.64	0	0.001	1690.00	405.65	202.82	2.79	11.19
143.09	0	0.001	1700.00	406.82	203.41	2.8	11.21

EXC. TEMP. (DEG. C)	AREA (SQ. M)
0.01	12.1000
0.02	2.9900
0.03	1.2200
0.04	0.6430
0.05	0.3630
0.06	0.2330
0.08	0.1450
0.09	0.0991
0.10	0.0684
0.11	0.0452
0.12	0.0321
0.13	0.0226
0.14	0.0149
0.15	0.0104
0.16	0.0071
0.17	0.0044
0.18	0.0026
0.19	0.0014
0.20	0.0007
0.22	0.0002

Copyright 2013 by Fluid Dynamix. Company Confidential.

APPENDIX D: MODEL INPUT DATA - CAT GENERATORS I**TABLE D.1****MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE EFFLUENT VOLUME DISCHARGED
CAT GENERATORS I**

1.0 24 bbl/d TS series.flo

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

TABLE D.2
**VISUAL PLUMES MODEL TEXT OUTPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
CAT GENERATORS I**
VISUAL PLUMES MODEL TEXT OUTPUT PDS FILE CONTENTS ARE LISTED BELOW:

PDSWIN	FLOATING	WARM	WATER	JETS	--				
FROUDE	NUMBER	LESS	THEN	1.0,	F=	1.004			
ASSUMING	UPSTREAM	WEDGE	PRESENT	-	USING	F	=	1.02	
AMBIENT	CONDITIONS	:	TEMP.	4	DEG.	C	VEL.	0.07	M/S
HEAT	CONVECTION	=	1.000						
DISCHARGE	CONDITIONS	:	TEMP.	=	16.1	C;			
DEPTH	=	0.13	M.	;	WIDTH	=	0.14	M.	
ANGLE	0	DEG	;	DISCHARGE	RATE	=	0	CU-M/S	
DISCHARGE	DENSIMENTRIC	FROUDE	NO.	=	1.02				

X(M.)	Y(M.)	EX TEMP (DEG. C)	TIME (SEC.)	Q/Q0 (DILU.)	QM/Q0	DEPTH (M.)	WIDTH (M.)
-------	-------	---------------------	----------------	-----------------	-------	---------------	---------------

0.73	0	12.115	10.100	2	1	0.02	0.98
0.73	0	11.945	10.100	2.03	1.01	0.02	0.98
0.74	0	11.782	10.200	2.06	1.03	0.02	0.98
0.74	0	11.627	10.300	2.08	1.04	0.02	0.98
0.75	0	11.477	10.300	2.11	1.06	0.02	0.98
0.75	0	11.334	10.400	2.14	1.07	0.02	0.98
0.76	0	11.196	10.400	2.16	1.08	0.02	0.98
0.77	0	10.935	10.600	2.22	1.11	0.02	0.99
0.78	0	10.693	10.700	2.27	1.13	0.02	0.99
0.79	0	10.466	10.800	2.32	1.16	0.02	0.99
0.8	0	10.254	11.000	2.36	1.18	0.02	0.99
0.82	0	9.867	11.200	2.46	1.23	0.02	1
0.84	0	9.522	11.500	2.54	1.27	0.02	1
0.86	0	9.21	11.700	2.63	1.32	0.02	1
0.89	0	8.928	12.000	2.71	1.36	0.02	1.01
0.93	0	8.432	12.500	2.87	1.44	0.03	1.01
0.97	0	8.01	13.100	3.03	1.51	0.03	1.02
1.01	0	7.642	13.600	3.17	1.59	0.03	1.03
1.05	0	7.319	14.100	3.31	1.66	0.03	1.04
1.14	0	6.773	15.200	3.58	1.79	0.03	1.05
1.22	0	6.324	16.300	3.83	1.92	0.03	1.07

Copyright 2013 by Fluid Dynamix. Company Confidential.

1.31	0	5.944	17.500	4.08	2.04	0.04	1.08
1.39	0	5.618	18.600	4.32	2.16	0.04	1.1
1.56	0	5.085	20.800	4.78	2.39	0.04	1.13
1.73	0	4.656	23.100	5.22	2.61	0.04	1.17
1.9	0	4.301	25.400	5.65	2.82	0.05	1.2
2.07	0	4	27.700	6.07	3.04	0.05	1.23
2.24	0	3.74	30.100	6.5	3.25	0.05	1.26
2.4	0	3.514	32.400	6.91	3.46	0.05	1.3
2.74	0	3.137	37.100	7.75	3.88	0.06	1.36
3.08	0	2.834	41.800	8.59	4.29	0.06	1.42
3.42	0	2.582	46.500	9.42	4.71	0.06	1.49
3.75	0	2.37	51.300	10.27	5.13	0.07	1.55
4.09	0	2.189	56.000	11.12	5.56	0.07	1.61
4.43	0	2.032	60.800	11.98	5.99	0.07	1.66
5.1	0	1.774	70.400	13.73	6.87	0.08	1.78
5.78	0	1.572	80.000	15.5	7.75	0.08	1.89
6.45	0	1.408	89.600	17.31	8.65	0.09	2
7.13	0	1.273	99.200	19.15	9.57	0.09	2.1
7.8	0	1.16	109.000	21.01	10.51	0.09	2.2
8.48	0	1.064	119.000	22.91	11.45	0.1	2.3
9.15	0	0.982	128.000	24.83	12.42	0.1	2.4
9.83	0	0.91	138.000	26.78	13.39	0.11	2.49
10.5	0	0.848	148.000	28.76	14.38	0.11	2.59
11.18	0	0.792	157.000	30.75	15.38	0.11	2.68
11.85	0	0.744	167.000	32.77	16.39	0.12	2.77
12.53	0	0.7	177.000	34.81	17.41	0.12	2.86
13.2	0	0.661	186.000	36.87	18.44	0.12	2.94
13.88	0	0.626	196.000	38.95	19.48	0.13	3.03
14.55	0	0.594	206.000	41.05	20.52	0.13	3.11
15.22	0	0.565	215.000	43.16	21.58	0.13	3.19
15.9	0	0.538	225.000	45.29	22.64	0.14	3.27
16.57	0	0.514	235.000	47.43	23.72	0.14	3.35
17.25	0	0.491	245.000	49.59	24.8	0.14	3.43
17.92	0	0.471	254.000	51.77	25.88	0.15	3.51
18.6	0	0.452	264.000	53.96	26.98	0.15	3.59
19.27	0	0.434	274.000	56.16	28.08	0.15	3.66
19.95	0	0.418	283.000	58.37	29.19	0.15	3.74
20.62	0	0.402	293.000	60.6	30.3	0.16	3.81
21.3	0	0.388	303.000	62.84	31.42	0.16	3.89
21.97	0	0.374	313.000	65.09	32.55	0.16	3.96
22.65	0	0.362	322.000	67.36	33.68	0.17	4.03
23.32	0	0.35	332.000	69.63	34.82	0.17	4.1

Copyright 2013 by Fluid Dynamix. Company Confidential.

24	0	0.339	342.000	71.92	35.96	0.17	4.17
24.67	0	0.328	351.000	74.21	37.11	0.17	4.24
25.35	0	0.318	361.000	76.52	38.26	0.18	4.31
26.02	0	0.309	371.000	78.84	39.42	0.18	4.38
26.7	0	0.3	380.000	81.16	40.58	0.18	4.45
27.37	0	0.292	390.000	83.5	41.75	0.18	4.51
28.05	0	0.284	400.000	85.84	42.92	0.19	4.58
28.72	0	0.276	410.000	88.19	44.1	0.19	4.65
29.4	0	0.269	419.000	90.56	45.28	0.19	4.71
30.07	0	0.262	429.000	92.93	46.46	0.19	4.78
30.74	0	0.256	439.000	95.31	47.65	0.2	4.84
31.42	0	0.249	448.000	97.7	48.85	0.2	4.91
32.09	0	0.243	458.000	100.09	50.05	0.2	4.97
32.77	0	0.238	468.000	102.49	51.25	0.2	5.03
33.44	0	0.232	478.000	104.91	52.45	0.2	5.1
34.12	0	0.227	487.000	107.32	53.66	0.21	5.16
34.79	0	0.222	497.000	109.75	54.88	0.21	5.22
35.47	0	0.217	507.000	112.18	56.09	0.21	5.28
36.14	0	0.213	516.000	114.62	57.31	0.21	5.34
36.82	0	0.208	526.000	117.07	58.54	0.21	5.4
37.49	0	0.204	536.000	119.53	59.76	0.22	5.46
38.17	0	0.2	545.000	121.99	60.99	0.22	5.52
38.84	0	0.196	555.000	124.46	62.23	0.22	5.58
39.52	0	0.192	565.000	126.93	63.47	0.22	5.64
40.19	0	0.188	575.000	129.41	64.71	0.23	5.7
40.87	0	0.185	584.000	131.9	65.95	0.23	5.76
41.54	0	0.181	594.000	134.39	67.2	0.23	5.81
42.22	0	0.178	604.000	136.89	68.45	0.23	5.87
42.89	0	0.175	613.000	139.4	69.7	0.23	5.93
43.57	0	0.172	623.000	141.91	70.96	0.24	5.99
44.24	0	0.169	633.000	144.43	72.21	0.24	6.04
44.92	0	0.166	642.000	146.95	73.48	0.24	6.1
45.59	0	0.163	652.000	149.48	74.74	0.24	6.15
46.27	0	0.16	662.000	152.01	76.01	0.24	6.21
46.94	0	0.158	672.000	154.55	77.28	0.24	6.26
47.61	0	0.155	681.000	157.1	78.55	0.25	6.32
48.29	0	0.153	691.000	159.65	79.83	0.25	6.37
48.96	0	0.15	701.000	162.21	81.1	0.25	6.43
49.64	0	0.148	710.000	164.77	82.38	0.25	6.48
50.31	0	0.146	720.000	167.33	83.67	0.25	6.54
50.99	0	0.143	730.000	169.91	84.95	0.26	6.59
51.66	0	0.141	739.000	172.48	86.24	0.26	6.64

Copyright 2013 by Fluid Dynamix. Company Confidential.

52.34	0	0.139	749.000	175.06	87.53	0.26	6.7
53.01	0	0.137	759.000	177.65	88.82	0.26	6.75
53.69	0	0.135	769.000	180.24	90.12	0.26	6.8
54.36	0	0.133	778.000	182.84	91.42	0.26	6.85
55.04	0	0.131	788.000	185.44	92.72	0.27	6.91
55.71	0	0.13	798.000	188.04	94.02	0.27	6.96
56.39	0	0.128	807.000	190.65	95.33	0.27	7.01
57.06	0	0.126	817.000	193.27	96.63	0.27	7.06
57.74	0	0.124	827.000	195.89	97.94	0.27	7.11
58.41	0	0.123	836.000	198.51	99.25	0.27	7.16
59.09	0	0.121	846.000	201.14	100.57	0.28	7.21
59.76	0	0.12	856.000	203.77	101.88	0.28	7.26
60.44	0	0.118	865.000	206.4	103.2	0.28	7.32
61.11	0	0.117	875.000	209.05	104.52	0.28	7.37
61.79	0	0.115	885.000	211.69	105.84	0.28	7.42
62.46	0	0.114	895.000	214.34	107.17	0.28	7.47
63.13	0	0.112	904.000	216.99	108.5	0.29	7.51
63.81	0	0.111	914.000	219.65	109.82	0.29	7.56
64.48	0	0.11	924.000	222.31	111.15	0.29	7.61
65.16	0	0.108	933.000	224.97	112.49	0.29	7.66
65.83	0	0.107	943.000	227.64	113.82	0.29	7.71
66.51	0	0.106	953.000	230.32	115.16	0.29	7.76
67.18	0	0.105	962.000	232.99	116.5	0.3	7.81
67.86	0	0.103	972.000	235.67	117.84	0.3	7.86
68.53	0	0.102	982.000	238.36	119.18	0.3	7.9
69.21	0	0.101	991.000	241.05	120.52	0.3	7.95
69.88	0	0.1	1000.000	243.74	121.87	0.3	8
70.56	0	0.099	1010.000	246.43	123.22	0.3	8.05
71.23	0	0.098	1020.000	249.13	124.57	0.3	8.09
71.91	0	0.097	1030.000	251.84	125.92	0.31	8.14
72.58	0	0.096	1040.000	254.54	127.27	0.31	8.19
73.26	0	0.095	1050.000	257.25	128.63	0.31	8.24
73.93	0	0.094	1060.000	259.97	129.98	0.31	8.28
74.61	0	0.093	1070.000	262.68	131.34	0.31	8.33
75.28	0	0.092	1080.000	265.4	132.7	0.31	8.38
75.96	0	0.091	1090.000	268.13	134.06	0.32	8.42
76.63	0	0.09	1100.000	270.85	135.43	0.32	8.47
77.31	0	0.089	1110.000	273.59	136.79	0.32	8.51
77.98	0	0.088	1120.000	276.32	138.16	0.32	8.56
78.66	0	0.087	1130.000	279.06	139.53	0.32	8.61
79.33	0	0.086	1140.000	281.8	140.9	0.32	8.65
80	0	0.086	1150.000	284.54	142.27	0.32	8.7

Copyright 2013 by Fluid Dynamix. Company Confidential.

80.68	0	0.085	1160.000	287.29	143.64	0.33	8.74
81.35	0	0.084	1170.000	290.04	145.02	0.33	8.79
82.03	0	0.083	1180.000	292.79	146.4	0.33	8.83
82.7	0	0.082	1190.000	295.55	147.77	0.33	8.88
83.38	0	0.082	1190.000	298.31	149.15	0.33	8.92
84.05	0	0.081	1200.000	301.07	150.54	0.33	8.97
84.73	0	0.08	1210.000	303.84	151.92	0.33	9.01
85.4	0	0.079	1220.000	306.61	153.3	0.34	9.05
86.08	0	0.079	1230.000	309.38	154.69	0.34	9.1
86.75	0	0.078	1240.000	312.15	156.08	0.34	9.14
87.43	0	0.077	1250.000	314.93	157.47	0.34	9.19
88.1	0	0.077	1260.000	317.71	158.86	0.34	9.23
88.78	0	0.076	1270.000	320.5	160.25	0.34	9.27
89.45	0	0.075	1280.000	323.28	161.64	0.34	9.32
90.13	0	0.075	1290.000	326.07	163.04	0.35	9.36
90.8	0	0.074	1300.000	328.87	164.43	0.35	9.4
91.48	0	0.073	1310.000	331.66	165.83	0.35	9.45
92.15	0	0.073	1320.000	334.46	167.23	0.35	9.49
92.83	0	0.072	1330.000	337.26	168.63	0.35	9.53
93.5	0	0.072	1340.000	340.07	170.03	0.35	9.58
94.18	0	0.071	1350.000	342.87	171.44	0.35	9.62
94.85	0	0.07	1360.000	345.68	172.84	0.35	9.66
95.52	0	0.07	1370.000	348.5	174.25	0.36	9.7
96.2	0	0.069	1380.000	351.31	175.66	0.36	9.75
96.87	0	0.069	1390.000	354.13	177.06	0.36	9.79
97.55	0	0.068	1400.000	356.95	178.47	0.36	9.83
98.22	0	0.068	1410.000	359.77	179.89	0.36	9.87
98.9	0	0.067	1420.000	362.6	181.3	0.36	9.91
99.57	0	0.067	1430.000	365.43	182.71	0.36	9.96
100.25	0	0.066	1440.000	368.26	184.13	0.36	10
100.92	0	0.066	1450.000	371.09	185.55	0.37	10.04
101.6	0	0.065	1460.000	373.93	186.96	0.37	10.08
102.27	0	0.065	1470.000	376.77	188.38	0.37	10.12
102.95	0	0.064	1480.000	379.61	189.8	0.37	10.16
103.62	0	0.064	1490.000	382.45	191.23	0.37	10.2
104.3	0	0.063	1500.000	385.3	192.65	0.37	10.25
104.97	0	0.063	1500.000	388.15	194.07	0.37	10.29
105.65	0	0.062	1510.000	391	195.5	0.37	10.33
106.32	0	0.062	1520.000	393.85	196.93	0.38	10.37
107	0	0.061	1530.000	396.71	198.36	0.38	10.41
107.67	0	0.061	1540.000	399.57	199.78	0.38	10.45
108.35	0	0.061	1550.000	402.43	201.22	0.38	10.49

Copyright 2013 by Fluid Dynamix. Company Confidential.

EXC. TEMP. (DEG. C)	AREA (SQ. M)
0.61	21.70
1.21	8.12
1.82	4.40
2.42	2.83
3.03	2.00
3.63	1.48
4.24	1.14
4.85	0.91
5.45	0.75
6.06	0.62
6.66	0.53
7.27	0.45
7.87	0.39
8.48	0.33
9.09	0.29
9.69	0.25
10.3	0.21
10.9	0.18
11.51	0.13
12.12	0.05

Copyright 2013 by Fluid Dynamix. Company Confidential.

APPENDIX E: MODEL INPUT DATA - CAT GENERATORS II**TABLE E.1****MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE EFFLUENT VOLUME DISCHARGED
CAT GENERATORS II**

1.0 24 bbl/d TS series.flo

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

610.0

TABLE E.2

**VISUAL PLUMES MODEL TEXT OUTPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
CAT GENERATORS II**

VISUAL PLUMES MODEL TEXT OUTPUT PDS FILE CONTENTS ARE LISTED BELOW:

PDSWIN	FLOATING	WARM	WATER	JETS					
FROUDE	NUMBER	LESS	THEN	1.0,	F=	1.004			
ASSUMING	UPSTREAM	WEDGE	PRESENT	-	USING	F	=	1.02	
AMBIENT	CONDITIONS	:	TEMP.	4	DEG.	C	VEL.	0.07	M/S
HEAT	CONVECTION	=	1						
DISCHARGE	CONDITIONS	:	TEMP.	=	16.1	C;			
DEPTH	=	0.13	M.	;	WIDTH	=	0.14	M.	
ANGLE	0	DEG	;	DISCHARGE	RATE	=	0	CU-M/S	
DISCHARGE	DENSIMENTRIC	FROUDE	NO.	=	1.02				

X(M.)	Y(M.)	EX TEMP (DEG. C)	TIME (SEC.)	Q/Q0 (DILU.)	QM/Q0	DEPTH (M.)	WIDTH (M.)
0.73	0	12.115	10.10	2	1	0.02	0.98
0.73	0	11.945	10.10	2.03	1.01	0.02	0.98
0.74	0	11.782	10.20	2.06	1.03	0.02	0.98
0.74	0	11.627	10.30	2.08	1.04	0.02	0.98
0.75	0	11.477	10.30	2.11	1.06	0.02	0.98
0.75	0	11.334	10.40	2.14	1.07	0.02	0.98
0.76	0	11.196	10.40	2.16	1.08	0.02	0.98
0.77	0	10.935	10.60	2.22	1.11	0.02	0.99
0.78	0	10.693	10.70	2.27	1.13	0.02	0.99
0.79	0	10.466	10.80	2.32	1.16	0.02	0.99
0.8	0	10.254	11.00	2.36	1.18	0.02	0.99
0.82	0	9.867	11.20	2.46	1.23	0.02	1
0.84	0	9.522	11.50	2.54	1.27	0.02	1
0.86	0	9.21	11.70	2.63	1.32	0.02	1
0.89	0	8.928	12.00	2.71	1.36	0.02	1.01
0.93	0	8.432	12.50	2.87	1.44	0.03	1.01
0.97	0	8.01	13.10	3.03	1.51	0.03	1.02
1.01	0	7.642	13.60	3.17	1.59	0.03	1.03
1.05	0	7.319	14.10	3.31	1.66	0.03	1.04
1.14	0	6.773	15.20	3.58	1.79	0.03	1.05
1.22	0	6.324	16.30	3.83	1.92	0.03	1.07

Copyright 2013 by Fluid Dynamix. Company Confidential.

1.31	0	5.944	17.50	4.08	2.04	0.04	1.08
1.39	0	5.618	18.60	4.32	2.16	0.04	1.1
1.56	0	5.085	20.80	4.78	2.39	0.04	1.13
1.73	0	4.656	23.10	5.22	2.61	0.04	1.17
1.9	0	4.301	25.40	5.65	2.82	0.05	1.2
2.07	0	4	27.70	6.07	3.04	0.05	1.23
2.24	0	3.74	30.10	6.5	3.25	0.05	1.26
2.4	0	3.514	32.40	6.91	3.46	0.05	1.3
2.74	0	3.137	37.10	7.75	3.88	0.06	1.36
3.08	0	2.834	41.80	8.59	4.29	0.06	1.42
3.42	0	2.582	46.50	9.42	4.71	0.06	1.49
3.75	0	2.37	51.30	10.27	5.13	0.07	1.55
4.09	0	2.189	56.00	11.12	5.56	0.07	1.61
4.43	0	2.032	60.80	11.98	5.99	0.07	1.66
5.1	0	1.774	70.40	13.73	6.87	0.08	1.78
5.78	0	1.572	80.00	15.5	7.75	0.08	1.89
6.45	0	1.408	89.60	17.31	8.65	0.09	2
7.13	0	1.273	99.20	19.15	9.57	0.09	2.1
7.8	0	1.16	109.00	21.01	10.51	0.09	2.2
8.48	0	1.064	119.00	22.91	11.45	0.1	2.3
9.15	0	0.982	128.00	24.83	12.42	0.1	2.4
9.83	0	0.91	138.00	26.78	13.39	0.11	2.49
10.5	0	0.848	148.00	28.76	14.38	0.11	2.59
11.18	0	0.792	157.00	30.75	15.38	0.11	2.68
11.85	0	0.744	167.00	32.77	16.39	0.12	2.77
12.53	0	0.7	177.00	34.81	17.41	0.12	2.86
13.2	0	0.661	186.00	36.87	18.44	0.12	2.94
13.88	0	0.626	196.00	38.95	19.48	0.13	3.03
14.55	0	0.594	206.00	41.05	20.52	0.13	3.11
15.22	0	0.565	215.00	43.16	21.58	0.13	3.19
15.9	0	0.538	225.00	45.29	22.64	0.14	3.27
16.57	0	0.514	235.00	47.43	23.72	0.14	3.35
17.25	0	0.491	245.00	49.59	24.8	0.14	3.43
17.92	0	0.471	254.00	51.77	25.88	0.15	3.51
18.6	0	0.452	264.00	53.96	26.98	0.15	3.59
19.27	0	0.434	274.00	56.16	28.08	0.15	3.66
19.95	0	0.418	283.00	58.37	29.19	0.15	3.74
20.62	0	0.402	293.00	60.6	30.3	0.16	3.81
21.3	0	0.388	303.00	62.84	31.42	0.16	3.89
21.97	0	0.374	313.00	65.09	32.55	0.16	3.96
22.65	0	0.362	322.00	67.36	33.68	0.17	4.03
23.32	0	0.35	332.00	69.63	34.82	0.17	4.1

Copyright 2013 by Fluid Dynamix. Company Confidential.

24	0	0.339	342.00	71.92	35.96	0.17	4.17
24.67	0	0.328	351.00	74.21	37.11	0.17	4.24
25.35	0	0.318	361.00	76.52	38.26	0.18	4.31
26.02	0	0.309	371.00	78.84	39.42	0.18	4.38
26.7	0	0.3	380.00	81.16	40.58	0.18	4.45
27.37	0	0.292	390.00	83.5	41.75	0.18	4.51
28.05	0	0.284	400.00	85.84	42.92	0.19	4.58
28.72	0	0.276	410.00	88.19	44.1	0.19	4.65
29.4	0	0.269	419.00	90.56	45.28	0.19	4.71
30.07	0	0.262	429.00	92.93	46.46	0.19	4.78
30.74	0	0.256	439.00	95.31	47.65	0.2	4.84
31.42	0	0.249	448.00	97.7	48.85	0.2	4.91
32.09	0	0.243	458.00	100.09	50.05	0.2	4.97
32.77	0	0.238	468.00	102.49	51.25	0.2	5.03
33.44	0	0.232	478.00	104.91	52.45	0.2	5.1
34.12	0	0.227	487.00	107.32	53.66	0.21	5.16
34.79	0	0.222	497.00	109.75	54.88	0.21	5.22
35.47	0	0.217	507.00	112.18	56.09	0.21	5.28
36.14	0	0.213	516.00	114.62	57.31	0.21	5.34
36.82	0	0.208	526.00	117.07	58.54	0.21	5.4
37.49	0	0.204	536.00	119.53	59.76	0.22	5.46
38.17	0	0.2	545.00	121.99	60.99	0.22	5.52
38.84	0	0.196	555.00	124.46	62.23	0.22	5.58
39.52	0	0.192	565.00	126.93	63.47	0.22	5.64
40.19	0	0.188	575.00	129.41	64.71	0.23	5.7
40.87	0	0.185	584.00	131.9	65.95	0.23	5.76
41.54	0	0.181	594.00	134.39	67.2	0.23	5.81
42.22	0	0.178	604.00	136.89	68.45	0.23	5.87
42.89	0	0.175	613.00	139.4	69.7	0.23	5.93
43.57	0	0.172	623.00	141.91	70.96	0.24	5.99
44.24	0	0.169	633.00	144.43	72.21	0.24	6.04
44.92	0	0.166	642.00	146.95	73.48	0.24	6.1
45.59	0	0.163	652.00	149.48	74.74	0.24	6.15
46.27	0	0.16	662.00	152.01	76.01	0.24	6.21
46.94	0	0.158	672.00	154.55	77.28	0.24	6.26
47.61	0	0.155	681.00	157.1	78.55	0.25	6.32
48.29	0	0.153	691.00	159.65	79.83	0.25	6.37
48.96	0	0.15	701.00	162.21	81.1	0.25	6.43
49.64	0	0.148	710.00	164.77	82.38	0.25	6.48
50.31	0	0.146	720.00	167.33	83.67	0.25	6.54
50.99	0	0.143	730.00	169.91	84.95	0.26	6.59
51.66	0	0.141	739.00	172.48	86.24	0.26	6.64

Copyright 2013 by Fluid Dynamix. Company Confidential.

52.34	0	0.139	749.00	175.06	87.53	0.26	6.7
53.01	0	0.137	759.00	177.65	88.82	0.26	6.75
53.69	0	0.135	769.00	180.24	90.12	0.26	6.8
54.36	0	0.133	778.00	182.84	91.42	0.26	6.85
55.04	0	0.131	788.00	185.44	92.72	0.27	6.91
55.71	0	0.13	798.00	188.04	94.02	0.27	6.96
56.39	0	0.128	807.00	190.65	95.33	0.27	7.01
57.06	0	0.126	817.00	193.27	96.63	0.27	7.06
57.74	0	0.124	827.00	195.89	97.94	0.27	7.11
58.41	0	0.123	836.00	198.51	99.25	0.27	7.16
59.09	0	0.121	846.00	201.14	100.57	0.28	7.21
59.76	0	0.12	856.00	203.77	101.88	0.28	7.26
60.44	0	0.118	865.00	206.4	103.2	0.28	7.32
61.11	0	0.117	875.00	209.05	104.52	0.28	7.37
61.79	0	0.115	885.00	211.69	105.84	0.28	7.42
62.46	0	0.114	895.00	214.34	107.17	0.28	7.47
63.13	0	0.112	904.00	216.99	108.5	0.29	7.51
63.81	0	0.111	914.00	219.65	109.82	0.29	7.56
64.48	0	0.11	924.00	222.31	111.15	0.29	7.61
65.16	0	0.108	933.00	224.97	112.49	0.29	7.66
65.83	0	0.107	943.00	227.64	113.82	0.29	7.71
66.51	0	0.106	953.00	230.32	115.16	0.29	7.76
67.18	0	0.105	962.00	232.99	116.5	0.3	7.81
67.86	0	0.103	972.00	235.67	117.84	0.3	7.86
68.53	0	0.102	982.00	238.36	119.18	0.3	7.9
69.21	0	0.101	991.00	241.05	120.52	0.3	7.95
69.88	0	0.1	1000.00	243.74	121.87	0.3	8
70.56	0	0.099	1010.00	246.43	123.22	0.3	8.05
71.23	0	0.098	1020.00	249.13	124.57	0.3	8.09
71.91	0	0.097	1030.00	251.84	125.92	0.31	8.14
72.58	0	0.096	1040.00	254.54	127.27	0.31	8.19
73.26	0	0.095	1050.00	257.25	128.63	0.31	8.24
73.93	0	0.094	1060.00	259.97	129.98	0.31	8.28
74.61	0	0.093	1070.00	262.68	131.34	0.31	8.33
75.28	0	0.092	1080.00	265.4	132.7	0.31	8.38
75.96	0	0.091	1090.00	268.13	134.06	0.32	8.42
76.63	0	0.09	1100.00	270.85	135.43	0.32	8.47
77.31	0	0.089	1110.00	273.59	136.79	0.32	8.51
77.98	0	0.088	1120.00	276.32	138.16	0.32	8.56
78.66	0	0.087	1130.00	279.06	139.53	0.32	8.61
79.33	0	0.086	1140.00	281.8	140.9	0.32	8.65
80	0	0.086	1150.00	284.54	142.27	0.32	8.7

Copyright 2013 by Fluid Dynamix. Company Confidential.

80.68	0	0.085	1160.00	287.29	143.64	0.33	8.74
81.35	0	0.084	1170.00	290.04	145.02	0.33	8.79
82.03	0	0.083	1180.00	292.79	146.4	0.33	8.83
82.7	0	0.082	1190.00	295.55	147.77	0.33	8.88
83.38	0	0.082	1190.00	298.31	149.15	0.33	8.92
84.05	0	0.081	1200.00	301.07	150.54	0.33	8.97
84.73	0	0.08	1210.00	303.84	151.92	0.33	9.01
85.4	0	0.079	1220.00	306.61	153.3	0.34	9.05
86.08	0	0.079	1230.00	309.38	154.69	0.34	9.1
86.75	0	0.078	1240.00	312.15	156.08	0.34	9.14
87.43	0	0.077	1250.00	314.93	157.47	0.34	9.19
88.1	0	0.077	1260.00	317.71	158.86	0.34	9.23
88.78	0	0.076	1270.00	320.5	160.25	0.34	9.27
89.45	0	0.075	1280.00	323.28	161.64	0.34	9.32
90.13	0	0.075	1290.00	326.07	163.04	0.35	9.36
90.8	0	0.074	1300.00	328.87	164.43	0.35	9.4
91.48	0	0.073	1310.00	331.66	165.83	0.35	9.45
92.15	0	0.073	1320.00	334.46	167.23	0.35	9.49
92.83	0	0.072	1330.00	337.26	168.63	0.35	9.53
93.5	0	0.072	1340.00	340.07	170.03	0.35	9.58
94.18	0	0.071	1350.00	342.87	171.44	0.35	9.62
94.85	0	0.07	1360.00	345.68	172.84	0.35	9.66
95.52	0	0.07	1370.00	348.5	174.25	0.36	9.7
96.2	0	0.069	1380.00	351.31	175.66	0.36	9.75
96.87	0	0.069	1390.00	354.13	177.06	0.36	9.79
97.55	0	0.068	1400.00	356.95	178.47	0.36	9.83
98.22	0	0.068	1410.00	359.77	179.89	0.36	9.87
98.9	0	0.067	1420.00	362.6	181.3	0.36	9.91
99.57	0	0.067	1430.00	365.43	182.71	0.36	9.96
100.25	0	0.066	1440.00	368.26	184.13	0.36	10
100.92	0	0.066	1450.00	371.09	185.55	0.37	10.04
101.6	0	0.065	1460.00	373.93	186.96	0.37	10.08
102.27	0	0.065	1470.00	376.77	188.38	0.37	10.12
102.95	0	0.064	1480.00	379.61	189.8	0.37	10.16
103.62	0	0.064	1490.00	382.45	191.23	0.37	10.2
104.3	0	0.063	1500.00	385.3	192.65	0.37	10.25
104.97	0	0.063	1500.00	388.15	194.07	0.37	10.29
105.65	0	0.062	1510.00	391	195.5	0.37	10.33
106.32	0	0.062	1520.00	393.85	196.93	0.38	10.37
107	0	0.061	1530.00	396.71	198.36	0.38	10.41
107.67	0	0.061	1540.00	399.57	199.78	0.38	10.45
108.35	0	0.061	1550.00	402.43	201.22	0.38	10.49

Copyright 2013 by Fluid Dynamix. Company Confidential.

EXC. TEMP. (DEG. C)	AREA (SQ. M)
0.61	21.70
1.21	8.12
1.82	4.40
2.42	2.83
3.03	2.00
3.63	1.48
4.24	1.14
4.85	0.91
5.45	0.75
6.06	0.62
6.66	0.53
7.27	0.45
7.87	0.39
8.48	0.33
9.09	0.29
9.69	0.25
10.3	0.21
10.9	0.18
11.51	0.13
12.12	0.05

Copyright 2013 by Fluid Dynamix. Company Confidential.

APPENDIX F: MODEL INPUT DATA - EVAPORATOR UNITS**TABLE F.1****MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE EFFLUENT VOLUME DISCHARGED
EVAPORATOR UNITS**

1.0 24 bbl/d TS series.flo

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

2200.0

TABLE F.2

**VISUAL PLUMES MODEL TEXT OUTPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
EVAPORATOR UNITS**

VISUAL PLUMES MODEL TEXT OUTPUT PDS FILE CONTENTS ARE LISTED BELOW:

PDSWIN	FLOATING	WARM	WATER	JETS						
AMBIENT	CONDITIONS	:	TEMP.	4	DEG.	C	VEL.	0.07	M/S	
HEAT	CONVECTION	=	1.00							
DISCHARGE	CONDITIONS	:	TEMP.	=	14	C;				
			DEPTH	=	0.14	M.	;	WIDTH	0.14	M.
ANGLE	0	DEG	;	DISCHARGE	RATE	=	0	CU-M/S		
DISCHARGE	DENSIMENTRIC	FROUDE	NO.	=	4.28					

X(M.)	Y(M.)	EX TEMP (DEG. C)	TIME (SEC.)	Q/Q0 (DILU.)	QM/Q0	DEPTH (M.)	WIDTH (M.)
-------	-------	---------------------	----------------	-----------------	-------	---------------	---------------

0.46	0	10.015	2.13	2	1	0.08	0.43
0.48	0	9.823	2.23	2.04	1.02	0.08	0.44
0.5	0	9.638	2.34	2.08	1.04	0.08	0.46
0.52	0	9.461	2.44	2.12	1.06	0.08	0.47
0.54	0	9.29	2.54	2.16	1.08	0.08	0.48
0.57	0	9.126	2.65	2.19	1.1	0.08	0.5
0.59	0	8.967	2.76	2.23	1.12	0.08	0.51
0.63	0	8.667	2.97	2.31	1.16	0.08	0.54
0.67	0	8.387	3.20	2.39	1.19	0.08	0.56
0.72	0	8.124	3.42	2.47	1.23	0.08	0.58
0.76	0	7.878	3.65	2.54	1.27	0.09	0.61
0.84	0	7.429	4.13	2.7	1.35	0.09	0.65
0.93	0	7.029	4.63	2.85	1.42	0.09	0.7
1.02	0	6.672	5.14	3	1.5	0.09	0.74
1.1	0	6.349	5.66	3.15	1.58	0.09	0.78
1.19	0	6.058	6.20	3.31	1.65	0.09	0.82
1.27	0	5.792	6.76	3.46	1.73	0.09	0.86
1.36	0	5.55	7.33	3.61	1.8	0.09	0.9
1.44	0	5.327	7.91	3.76	1.88	0.1	0.94
1.62	0	4.933	9.12	4.06	2.03	0.1	1.01
1.79	0	4.594	10.40	4.36	2.18	0.1	1.08
1.96	0	4.299	11.70	4.66	2.33	0.1	1.15

Copyright 2013 by Fluid Dynamix. Company Confidential.

2.13	0	4.039	13.00	4.96	2.48	0.11	1.22
2.47	0	3.604	15.80	5.56	2.78	0.11	1.35
2.82	0	3.253	18.70	6.16	3.08	0.12	1.47
3.16	0	2.962	21.80	6.77	3.38	0.12	1.59
3.5	0	2.717	24.90	7.38	3.69	0.13	1.7
3.84	0	2.507	28.20	7.99	4	0.13	1.81
4.19	0	2.326	31.50	8.62	4.31	0.14	1.92
4.87	0	2.028	38.40	9.89	4.94	0.14	2.12
5.56	0	1.794	45.70	11.18	5.59	0.15	2.32
6.24	0	1.606	53.10	12.49	6.25	0.16	2.5
6.93	0	1.45	60.70	13.83	6.92	0.17	2.68
7.62	0	1.32	68.60	15.19	7.6	0.17	2.86
8.3	0	1.21	76.50	16.58	8.29	0.18	3.02
8.99	0	1.116	84.60	17.98	8.99	0.19	3.19
9.67	0	1.034	92.90	19.4	9.7	0.2	3.34
10.36	0	0.962	101.00	20.85	10.42	0.2	3.5
11.05	0	0.899	110.00	22.31	11.16	0.21	3.65
11.73	0	0.843	118.00	23.79	11.9	0.22	3.8
12.42	0	0.793	127.00	25.29	12.64	0.22	3.94
13.1	0	0.748	135.00	26.8	13.4	0.23	4.08
13.79	0	0.708	144.00	28.34	14.17	0.23	4.22
14.47	0	0.671	153.00	29.88	14.94	0.24	4.35
15.16	0	0.638	162.00	31.45	15.72	0.25	4.49
15.85	0	0.607	171.00	33.02	16.51	0.25	4.62
16.53	0	0.579	180.00	34.61	17.31	0.26	4.75
17.22	0	0.554	189.00	36.22	18.11	0.26	4.87
17.9	0	0.53	198.00	37.83	18.92	0.27	5
18.59	0	0.508	207.00	39.47	19.73	0.27	5.12
19.28	0	0.488	216.00	41.11	20.55	0.28	5.24
19.96	0	0.469	225.00	42.76	21.38	0.28	5.36
20.65	0	0.451	234.00	44.43	22.22	0.29	5.48
21.33	0	0.435	243.00	46.11	23.05	0.29	5.6
22.02	0	0.42	252.00	47.8	23.9	0.3	5.71
22.7	0	0.405	261.00	49.5	24.75	0.3	5.83
23.39	0	0.392	271.00	51.21	25.6	0.31	5.94
24.08	0	0.379	280.00	52.93	26.46	0.31	6.05
24.76	0	0.367	289.00	54.66	27.33	0.32	6.16
25.45	0	0.356	299.00	56.4	28.2	0.32	6.27
26.13	0	0.345	308.00	58.15	29.07	0.33	6.38
26.82	0	0.335	317.00	59.91	29.95	0.33	6.49
27.5	0	0.325	327.00	61.68	30.84	0.34	6.59
28.19	0	0.316	336.00	63.45	31.73	0.34	6.7

Copyright 2013 by Fluid Dynamix. Company Confidential.

28.88	0	0.307	345.00	65.24	32.62	0.35	6.8
29.56	0	0.299	355.00	67.03	33.52	0.35	6.91
30.25	0	0.291	364.00	68.83	34.42	0.35	7.01
30.93	0	0.284	374.00	70.64	35.32	0.36	7.11
31.62	0	0.277	383.00	72.46	36.23	0.36	7.21
32.31	0	0.27	392.00	74.28	37.14	0.37	7.31
32.99	0	0.263	402.00	76.12	38.06	0.37	7.41
33.68	0	0.257	411.00	77.95	38.98	0.38	7.51
34.36	0	0.251	421.00	79.8	39.9	0.38	7.6
35.05	0	0.246	430.00	81.66	40.83	0.38	7.7
35.73	0	0.24	440.00	83.52	41.76	0.39	7.8
36.42	0	0.235	449.00	85.38	42.69	0.39	7.89
37.11	0	0.23	459.00	87.26	43.63	0.4	7.99
37.79	0	0.225	468.00	89.14	44.57	0.4	8.08
38.48	0	0.22	478.00	91.02	45.51	0.4	8.17
39.16	0	0.216	487.00	92.92	46.46	0.41	8.27
39.85	0	0.211	497.00	94.82	47.41	0.41	8.36
40.53	0	0.207	506.00	96.72	48.36	0.42	8.45
41.22	0	0.203	516.00	98.63	49.32	0.42	8.54
41.91	0	0.199	525.00	100.55	50.28	0.42	8.63
42.59	0	0.196	535.00	102.47	51.24	0.43	8.72
43.28	0	0.192	545.00	104.4	52.2	0.43	8.81
43.96	0	0.189	554.00	106.34	53.17	0.43	8.9
44.65	0	0.185	564.00	108.28	54.14	0.44	8.99
45.34	0	0.182	573.00	110.22	55.11	0.44	9.07
46.02	0	0.179	583.00	112.17	56.09	0.45	9.16
46.71	0	0.176	592.00	114.13	57.06	0.45	9.25
47.39	0	0.173	602.00	116.09	58.04	0.45	9.33
48.08	0	0.17	612.00	118.05	59.03	0.46	9.42
48.76	0	0.167	621.00	120.02	60.01	0.46	9.5
49.45	0	0.164	631.00	122	61	0.46	9.59
50.14	0	0.162	641.00	123.98	61.99	0.47	9.67
50.82	0	0.159	650.00	125.96	62.98	0.47	9.76
51.51	0	0.157	660.00	127.95	63.98	0.47	9.84
52.19	0	0.154	669.00	129.95	64.97	0.48	9.92
52.88	0	0.152	679.00	131.95	65.97	0.48	10.01
53.57	0	0.15	689.00	133.95	66.97	0.48	10.09
54.25	0	0.147	698.00	135.96	67.98	0.49	10.17
54.94	0	0.145	708.00	137.97	68.98	0.49	10.25
55.62	0	0.143	718.00	139.99	69.99	0.49	10.33
56.31	0	0.141	727.00	142.01	71	0.5	10.41
56.99	0	0.139	737.00	144.03	72.02	0.5	10.49

Copyright 2013 by Fluid Dynamix. Company Confidential.

57.68	0	0.137	747.00	146.06	73.03	0.5	10.57
58.37	0	0.135	756.00	148.09	74.05	0.51	10.65
59.05	0	0.134	766.00	150.13	75.07	0.51	10.73
59.74	0	0.132	775.00	152.17	76.09	0.51	10.81
60.42	0	0.13	785.00	154.22	77.11	0.52	10.89
61.11	0	0.128	795.00	156.27	78.13	0.52	10.97
61.79	0	0.127	804.00	158.32	79.16	0.52	11.04
62.48	0	0.125	814.00	160.38	80.19	0.53	11.12
63.17	0	0.123	824.00	162.44	81.22	0.53	11.2
63.85	0	0.122	833.00	164.5	82.25	0.53	11.28
64.54	0	0.12	843.00	166.57	83.29	0.54	11.35
65.22	0	0.119	853.00	168.64	84.32	0.54	11.43
65.91	0	0.117	863.00	170.72	85.36	0.54	11.5
66.6	0	0.116	872.00	172.8	86.4	0.55	11.58
67.28	0	0.115	882.00	174.88	87.44	0.55	11.66
67.97	0	0.113	892.00	176.97	88.48	0.55	11.73
68.65	0	0.112	901.00	179.06	89.53	0.56	11.81
69.34	0	0.111	911.00	181.15	90.58	0.56	11.88
70.02	0	0.109	921.00	183.25	91.62	0.56	11.95
70.71	0	0.108	930.00	185.35	92.67	0.56	12.03
71.4	0	0.107	940.00	187.45	93.73	0.57	12.1
72.08	0	0.106	950.00	189.56	94.78	0.57	12.17
72.77	0	0.105	959.00	191.67	95.83	0.57	12.25
73.45	0	0.103	969.00	193.78	96.89	0.58	12.32
74.14	0	0.102	979.00	195.9	97.95	0.58	12.39
74.82	0	0.101	989.00	198.02	99.01	0.58	12.47
75.51	0	0.1	998.00	200.14	100.07	0.59	12.54
76.2	0	0.099	1010.00	202.26	101.13	0.59	12.61
76.88	0	0.098	1020.00	204.39	102.2	0.59	12.68
77.57	0	0.097	1030.00	206.53	103.26	0.59	12.75
78.25	0	0.096	1040.00	208.66	104.33	0.6	12.82
78.94	0	0.095	1050.00	210.8	105.4	0.6	12.89
79.63	0	0.094	1060.00	212.94	106.47	0.6	12.97
80.31	0	0.093	1070.00	215.08	107.54	0.61	13.04
81	0	0.092	1080.00	217.23	108.61	0.61	13.11
81.68	0	0.091	1090.00	219.38	109.69	0.61	13.18
82.37	0	0.09	1100.00	221.53	110.77	0.61	13.25
83.05	0	0.09	1110.00	223.69	111.84	0.62	13.31
83.74	0	0.089	1110.00	225.85	112.92	0.62	13.38
84.43	0	0.088	1120.00	228.01	114	0.62	13.45
85.11	0	0.087	1130.00	230.17	115.09	0.62	13.52
85.8	0	0.086	1140.00	232.34	116.17	0.63	13.59

Copyright 2013 by Fluid Dynamix. Company Confidential.

86.48	0	0.085	1150.00	234.51	117.25	0.63	13.66
87.17	0	0.085	1160.00	236.68	118.34	0.63	13.73
87.86	0	0.084	1170.00	238.85	119.43	0.64	13.8
88.54	0	0.083	1180.00	241.03	120.52	0.64	13.86
89.23	0	0.082	1190.00	243.21	121.61	0.64	13.93
89.91	0	0.082	1200.00	245.39	122.7	0.64	14
90.6	0	0.081	1210.00	247.58	123.79	0.65	14.07
91.28	0	0.08	1220.00	249.77	124.88	0.65	14.13
91.97	0	0.08	1230.00	251.96	125.98	0.65	14.2
92.66	0	0.079	1240.00	254.15	127.07	0.65	14.27
93.34	0	0.078	1250.00	256.35	128.17	0.66	14.33
94.03	0	0.078	1260.00	258.54	129.27	0.66	14.4
94.71	0	0.077	1270.00	260.74	130.37	0.66	14.46
95.4	0	0.076	1280.00	262.95	131.47	0.66	14.53
96.08	0	0.076	1290.00	265.15	132.58	0.67	14.6
96.77	0	0.075	1300.00	267.36	133.68	0.67	14.66
97.46	0	0.074	1310.00	269.57	134.79	0.67	14.73
98.14	0	0.074	1320.00	271.78	135.89	0.67	14.79
98.83	0	0.073	1330.00	274	137	0.68	14.86
99.51	0	0.073	1340.00	276.21	138.11	0.68	14.92
100.2	0	0.072	1350.00	278.43	139.22	0.68	14.99
100.89	0	0.071	1360.00	280.66	140.33	0.68	15.05
101.57	0	0.071	1370.00	282.88	141.44	0.69	15.12
102.26	0	0.07	1380.00	285.11	142.55	0.69	15.18
102.94	0	0.07	1390.00	287.34	143.67	0.69	15.24
103.63	0	0.069	1400.00	289.57	144.78	0.69	15.31
104.31	0	0.069	1410.00	291.8	145.9	0.7	15.37
105	0	0.068	1420.00	294.04	147.02	0.7	15.44
105.69	0	0.068	1430.00	296.27	148.14	0.7	15.5
106.37	0	0.067	1440.00	298.52	149.26	0.7	15.56
107.06	0	0.067	1450.00	300.76	150.38	0.71	15.63
107.74	0	0.066	1460.00	303	151.5	0.71	15.69
108.43	0	0.066	1470.00	305.25	152.62	0.71	15.75
109.11	0	0.065	1480.00	307.5	153.75	0.71	15.81
109.8	0	0.065	1490.00	309.75	154.87	0.72	15.88
110.49	0	0.064	1490.00	312	156	0.72	15.94
111.17	0	0.064	1500.00	314.26	157.13	0.72	16
111.86	0	0.063	1510.00	316.51	158.26	0.72	16.06
112.54	0	0.063	1520.00	318.77	159.39	0.73	16.12
113.23	0	0.062	1530.00	321.03	160.52	0.73	16.19
113.92	0	0.062	1540.00	323.3	161.65	0.73	16.25
114.6	0	0.062	1550.00	325.56	162.78	0.73	16.31

Copyright 2013 by Fluid Dynamix. Company Confidential.

115.29	0	0.061	1560.00	327.83	163.92	0.74	16.37
115.97	0	0.061	1570.00	330.1	165.05	0.74	16.43
116.66	0	0.06	1580.00	332.37	166.19	0.74	16.49
117.34	0	0.06	1590.00	334.65	167.32	0.74	16.55
118.03	0	0.059	1600.00	336.92	168.46	0.75	16.61
118.72	0	0.059	1610.00	339.2	169.6	0.75	16.68
119.4	0	0.059	1620.00	341.48	170.74	0.75	16.74
120.09	0	0.058	1630.00	343.76	171.88	0.75	16.8
120.77	0	0.058	1640.00	346.04	173.02	0.75	16.86
121.46	0	0.058	1650.00	348.33	174.16	0.76	16.92
122.15	0	0.057	1660.00	350.62	175.31	0.76	16.98
122.83	0	0.057	1670.00	352.91	176.45	0.76	17.04
123.52	0	0.056	1680.00	355.2	177.6	0.76	17.1
124.2	0	0.056	1690.00	357.49	178.74	0.77	17.16
124.89	0	0.056	1700.00	359.78	179.89	0.77	17.22
125.57	0	0.055	1710.00	362.08	181.04	0.77	17.27
126.26	0	0.055	1720.00	364.38	182.19	0.77	17.33
126.95	0	0.055	1730.00	366.68	183.34	0.78	17.39
127.63	0	0.054	1740.00	368.98	184.49	0.78	17.45
128.32	0	0.054	1750.00	371.29	185.64	0.78	17.51
129	0	0.054	1760.00	373.59	186.8	0.78	17.57
129.69	0	0.053	1770.00	375.9	187.95	0.78	17.63
130.37	0	0.053	1780.00	378.21	189.1	0.79	17.69
131.06	0	0.053	1790.00	380.52	190.26	0.79	17.75
131.75	0	0.052	1800.00	382.83	191.42	0.79	17.8
132.43	0	0.052	1810.00	385.15	192.57	0.79	17.86
133.12	0	0.052	1820.00	387.47	193.73	0.8	17.92
133.8	0	0.051	1830.00	389.78	194.89	0.8	17.98
134.49	0	0.051	1840.00	392.1	196.05	0.8	18.04
135.18	0	0.051	1850.00	394.43	197.21	0.8	18.09
135.86	0	0.051	1860.00	396.75	198.37	0.8	18.15
136.55	0	0.05	1870.00	399.07	199.54	0.81	18.21
137.23	0	0.05	1880.00	401.4	200.7	0.81	18.27

Copyright 2013 by Fluid Dynamix. Company Confidential.

EXC. TEMP. (DEG. C)	AREA (SQ. M)
0.5	41.70
1	13.80
1.5	6.78
2	3.97
2.5	2.50
3	1.69
3.51	1.22
4.01	0.89
4.51	0.66
5.01	0.50
5.51	0.39
6.01	0.30
6.51	0.24
7.01	0.19
7.51	0.15
8.01	0.12
8.51	0.10
9.01	0.08
9.51	0.06
10.02	0.03

Copyright 2013 by Fluid Dynamix. Company Confidential.

TABLE G.2
**VISUAL PLUMES MODEL TEXT OUTPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
SCR Room AC**
VISUAL PLUMES MODEL TEXT OUTPUT PDS FILE CONTENTS ARE LISTED BELOW:

PDSWIN	FLOATING	WARM	WATER	JETS					
AMBIENT HEAT	CONDITIONS CONVECTION	:	TEMP. =	4 1.00	DEG.	C	VEL.	0.07	M/S
DISCHARGE DEPTH	CONDITIONS =	: 0.09	TEMP. M.	= ;	4.2 WIDTH	C; =	0.09	M.	
ANGLE	0	DEG		DISCHARGE RATE			= 0		CU-M/S
DISCHARGE	DENSIMENTRIC	FROUDE	NO.	=	16274.06				
X(M.)	Y(M.)	EX TEMP (DEG. C)	TIME (SEC.)	Q/Q0 (DILU.)	QM/Q0	DEPTH (M.)	WIDTH (M.)		
0.02	0	0.215	1.31	2	1	0.06	0.06		
0.02	0	0.212	1.53	2.03	1.02	0.06	0.06		
0.03	0	0.209	1.75	2.06	1.03	0.06	0.06		
0.03	0	0.206	1.95	2.09	1.04	0.06	0.06		
0.03	0	0.203	2.15	2.12	1.06	0.06	0.06		
0.04	0	0.2	2.34	2.15	1.07	0.06	0.06		
0.04	0	0.198	2.52	2.18	1.09	0.06	0.06		
0.05	0	0.192	2.87	2.23	1.12	0.06	0.07		
0.06	0	0.188	3.20	2.29	1.15	0.06	0.07		
0.06	0	0.183	3.51	2.35	1.17	0.06	0.07		
0.07	0	0.179	3.81	2.4	1.2	0.06	0.07		
0.08	0	0.171	4.37	2.51	1.26	0.06	0.07		
0.1	0	0.164	4.89	2.62	1.31	0.06	0.07		
0.11	0	0.158	5.38	2.72	1.36	0.06	0.07		
0.13	0	0.152	5.85	2.83	1.41	0.06	0.07		
0.16	0	0.142	6.72	3.03	1.51	0.06	0.07		
0.18	0	0.134	7.54	3.22	1.61	0.06	0.08		
0.21	0	0.126	8.31	3.41	1.7	0.06	0.08		
0.24	0	0.12	9.05	3.59	1.8	0.07	0.08		
0.3	0	0.109	10.40	3.94	1.97	0.07	0.09		
0.36	0	0.1	11.80	4.28	2.14	0.07	0.09		
0.41	0	0.093	13.00	4.61	2.3	0.07	0.1		
0.47	0	0.087	14.20	4.92	2.46	0.07	0.1		
0.58	0	0.078	16.60	5.53	2.76	0.07	0.11		
0.7	0	0.071	18.80	6.1	3.05	0.07	0.12		
0.81	0	0.065	21.00	6.65	3.33	0.07	0.12		
0.93	0	0.06	23.10	7.19	3.59	0.07	0.13		
1.04	0	0.056	25.10	7.71	3.85	0.07	0.14		
1.16	0	0.053	27.20	8.21	4.11	0.08	0.14		

Copyright 2013 by Fluid Dynamix. Company Confidential.

1.38	0	0.047	31.20	9.18	4.59	0.08	0.15
1.61	0	0.043	35.10	10.12	5.06	0.08	0.16
1.84	0	0.039	38.90	11.03	5.52	0.08	0.17
2.07	0	0.036	42.70	11.92	5.96	0.08	0.18
2.53	0	0.032	50.10	13.62	6.81	0.09	0.2
2.98	0	0.029	57.40	15.27	7.64	0.09	0.21
3.44	0	0.026	64.70	16.87	8.43	0.09	0.23
3.9	0	0.024	71.80	18.42	9.21	0.09	0.24
4.36	0	0.022	78.90	19.95	9.97	0.1	0.25
4.81	0	0.02	86.00	21.44	10.72	0.1	0.26
5.27	0	0.019	93.00	22.91	11.46	0.1	0.28
5.73	0	0.018	100.00	24.37	12.18	0.1	0.29
6.19	0	0.017	107.00	25.8	12.9	0.1	0.3
6.64	0	0.016	114.00	27.22	13.61	0.11	0.31
7.1	0	0.015	121.00	28.62	14.31	0.11	0.32
7.56	0	0.015	128.00	30.01	15	0.11	0.33
8.01	0	0.014	135.00	31.39	15.69	0.11	0.34
8.47	0	0.013	141.00	32.75	16.38	0.11	0.34
8.93	0	0.013	148.00	34.11	17.05	0.12	0.35
9.39	0	0.012	155.00	35.45	17.73	0.12	0.36
9.84	0	0.012	162.00	36.79	18.4	0.12	0.37
10.3	0	0.011	169.00	38.12	19.06	0.12	0.38
10.76	0	0.011	176.00	39.45	19.72	0.12	0.39
11.21	0	0.011	182.00	40.76	20.38	0.12	0.39
11.67	0	0.01	189.00	42.07	21.04	0.13	0.4
12.13	0	0.01	196.00	43.37	21.69	0.13	0.41
12.59	0	0.01	203.00	44.67	22.33	0.13	0.41
13.04	0	0.009	210.00	45.96	22.98	0.13	0.42
13.5	0	0.009	216.00	47.25	23.62	0.13	0.43
13.96	0	0.009	223.00	48.53	24.26	0.13	0.44
14.41	0	0.009	230.00	49.81	24.9	0.13	0.44
14.87	0	0.009	237.00	51.08	25.54	0.14	0.45
15.33	0	0.008	243.00	52.35	26.17	0.14	0.46
15.79	0	0.008	250.00	53.61	26.8	0.14	0.46
16.24	0	0.008	257.00	54.87	27.43	0.14	0.47
16.7	0	0.008	263.00	56.12	28.06	0.14	0.47
17.16	0	0.008	270.00	57.38	28.69	0.14	0.48
17.62	0	0.007	277.00	58.63	29.31	0.14	0.49
18.07	0	0.007	284.00	59.87	29.94	0.14	0.49
18.53	0	0.007	290.00	61.11	30.56	0.15	0.5
18.99	0	0.007	297.00	62.35	31.18	0.15	0.5
19.44	0	0.007	304.00	63.59	31.79	0.15	0.51
19.9	0	0.007	310.00	64.82	32.41	0.15	0.52
20.36	0	0.007	317.00	66.05	33.03	0.15	0.52
20.82	0	0.006	324.00	67.28	33.64	0.15	0.53
21.27	0	0.006	330.00	68.51	34.25	0.15	0.53
21.73	0	0.006	337.00	69.73	34.86	0.15	0.54
22.19	0	0.006	344.00	70.95	35.47	0.15	0.54
22.64	0	0.006	350.00	72.17	36.08	0.16	0.55

Copyright 2013 by Fluid Dynamix. Company Confidential.

23.1	0	0.006	357.00	73.38	36.69	0.16	0.55
23.56	0	0.006	364.00	74.6	37.3	0.16	0.56
24.02	0	0.006	370.00	75.81	37.9	0.16	0.56
24.47	0	0.006	377.00	77.02	38.51	0.16	0.57
24.93	0	0.006	384.00	78.22	39.11	0.16	0.57
25.39	0	0.005	390.00	79.43	39.72	0.16	0.58
25.84	0	0.005	397.00	80.63	40.32	0.16	0.58
26.3	0	0.005	404.00	81.84	40.92	0.16	0.59
26.76	0	0.005	410.00	83.04	41.52	0.17	0.59
27.22	0	0.005	417.00	84.23	42.12	0.17	0.6
27.67	0	0.005	424.00	85.43	42.71	0.17	0.6
28.13	0	0.005	430.00	86.62	43.31	0.17	0.61
28.59	0	0.005	437.00	87.82	43.91	0.17	0.61
29.05	0	0.005	444.00	89.01	44.5	0.17	0.62
29.5	0	0.005	450.00	90.2	45.1	0.17	0.62
29.96	0	0.005	457.00	91.39	45.69	0.17	0.63
30.42	0	0.005	464.00	92.57	46.29	0.17	0.63
30.87	0	0.005	470.00	93.76	46.88	0.17	0.64
31.33	0	0.005	477.00	94.94	47.47	0.18	0.64
31.79	0	0.005	484.00	96.12	48.06	0.18	0.64
32.25	0	0.004	490.00	97.31	48.65	0.18	0.65
32.7	0	0.004	497.00	98.48	49.24	0.18	0.65
33.16	0	0.004	503.00	99.66	49.83	0.18	0.66
33.62	0	0.004	510.00	100.84	50.42	0.18	0.66
34.07	0	0.004	517.00	102.02	51.01	0.18	0.67
34.53	0	0.004	523.00	103.19	51.6	0.18	0.67
34.99	0	0.004	530.00	104.36	52.18	0.18	0.67
35.45	0	0.004	537.00	105.54	52.77	0.18	0.68
35.9	0	0.004	543.00	106.71	53.35	0.18	0.68
36.36	0	0.004	550.00	107.88	53.94	0.19	0.69
36.82	0	0.004	557.00	109.05	54.52	0.19	0.69
37.27	0	0.004	563.00	110.21	55.11	0.19	0.69
37.73	0	0.004	570.00	111.38	55.69	0.19	0.7
38.19	0	0.004	576.00	112.55	56.27	0.19	0.7
38.65	0	0.004	583.00	113.71	56.86	0.19	0.71
39.1	0	0.004	590.00	114.87	57.44	0.19	0.71
39.56	0	0.004	596.00	116.04	58.02	0.19	0.71
40.02	0	0.004	603.00	117.2	58.6	0.19	0.72
40.48	0	0.004	610.00	118.36	59.18	0.19	0.72
40.93	0	0.004	616.00	119.52	59.76	0.19	0.73
41.39	0	0.004	623.00	120.68	60.34	0.19	0.73
41.85	0	0.004	629.00	121.83	60.92	0.2	0.73
42.3	0	0.004	636.00	122.99	61.5	0.2	0.74
42.76	0	0.004	643.00	124.15	62.07	0.2	0.74
43.22	0	0.003	649.00	125.3	62.65	0.2	0.75
43.68	0	0.003	656.00	126.46	63.23	0.2	0.75
44.13	0	0.003	662.00	127.61	63.8	0.2	0.75
44.59	0	0.003	669.00	128.76	64.38	0.2	0.76
45.05	0	0.003	676.00	129.91	64.96	0.2	0.76

Copyright 2013 by Fluid Dynamix. Company Confidential.

45.5	0	0.003	682.00	131.06	65.53	0.2	0.76
45.96	0	0.003	689.00	132.21	66.11	0.2	0.77
46.42	0	0.003	695.00	133.36	66.68	0.2	0.77
46.88	0	0.003	702.00	134.51	67.26	0.2	0.78
47.33	0	0.003	709.00	135.66	67.83	0.21	0.78
47.79	0	0.003	715.00	136.81	68.4	0.21	0.78
48.25	0	0.003	722.00	137.95	68.98	0.21	0.79
48.7	0	0.003	729.00	139.1	69.55	0.21	0.79
49.16	0	0.003	735.00	140.24	70.12	0.21	0.79
49.62	0	0.003	742.00	141.39	70.69	0.21	0.8
50.08	0	0.003	748.00	142.53	71.26	0.21	0.8
50.53	0	0.003	755.00	143.67	71.84	0.21	0.8
50.99	0	0.003	762.00	144.81	72.41	0.21	0.81
51.45	0	0.003	768.00	145.95	72.98	0.21	0.81
51.91	0	0.003	775.00	147.09	73.55	0.21	0.81
52.36	0	0.003	781.00	148.23	74.12	0.21	0.82
52.82	0	0.003	788.00	149.37	74.69	0.21	0.82
53.28	0	0.003	795.00	150.51	75.26	0.21	0.82
53.73	0	0.003	801.00	151.65	75.83	0.22	0.83
54.19	0	0.003	808.00	152.79	76.39	0.22	0.83
54.65	0	0.003	814.00	153.92	76.96	0.22	0.83
55.11	0	0.003	821.00	155.06	77.53	0.22	0.84
55.56	0	0.003	828.00	156.2	78.1	0.22	0.84
56.02	0	0.003	834.00	157.33	78.67	0.22	0.84
56.48	0	0.003	841.00	158.46	79.23	0.22	0.85
56.93	0	0.003	847.00	159.6	79.8	0.22	0.85
57.39	0	0.003	854.00	160.73	80.37	0.22	0.85
57.85	0	0.003	861.00	161.86	80.93	0.22	0.86
58.31	0	0.003	867.00	163	81.5	0.22	0.86
58.76	0	0.003	874.00	164.13	82.06	0.22	0.86
59.22	0	0.003	880.00	165.26	82.63	0.22	0.87
59.68	0	0.003	887.00	166.39	83.19	0.22	0.87
60.13	0	0.003	893.00	167.52	83.76	0.23	0.87
60.59	0	0.003	900.00	168.65	84.32	0.23	0.88
61.05	0	0.003	907.00	169.78	84.89	0.23	0.88
61.51	0	0.003	913.00	170.9	85.45	0.23	0.88
61.96	0	0.003	920.00	172.03	86.02	0.23	0.89
62.42	0	0.003	926.00	173.16	86.58	0.23	0.89
62.88	0	0.003	933.00	174.29	87.14	0.23	0.89
63.34	0	0.002	940.00	175.41	87.71	0.23	0.9
63.79	0	0.002	946.00	176.54	88.27	0.23	0.9
64.25	0	0.002	953.00	177.66	88.83	0.23	0.9
64.71	0	0.002	959.00	178.79	89.39	0.23	0.91
65.16	0	0.002	966.00	179.91	89.96	0.23	0.91
65.62	0	0.002	973.00	181.04	90.52	0.23	0.91
66.08	0	0.002	979.00	182.16	91.08	0.23	0.91
66.54	0	0.002	986.00	183.28	91.64	0.24	0.92
66.99	0	0.002	992.00	184.4	92.2	0.24	0.92
67.45	0	0.002	999.00	185.53	92.76	0.24	0.92

Copyright 2013 by Fluid Dynamix. Company Confidential.

67.91	0	0.002	1010.00	186.65	93.32	0.24	0.93
68.36	0	0.002	1010.00	187.77	93.88	0.24	0.93
68.82	0	0.002	1020.00	188.89	94.45	0.24	0.93
69.28	0	0.002	1030.00	190.01	95.01	0.24	0.94
69.74	0	0.002	1030.00	191.13	95.56	0.24	0.94
70.19	0	0.002	1040.00	192.25	96.12	0.24	0.94
70.65	0	0.002	1050.00	193.37	96.68	0.24	0.94
71.11	0	0.002	1050.00	194.49	97.24	0.24	0.95
71.56	0	0.002	1060.00	195.6	97.8	0.24	0.95
72.02	0	0.002	1060.00	196.72	98.36	0.24	0.95
72.48	0	0.002	1070.00	197.84	98.92	0.24	0.96
72.94	0	0.002	1080.00	198.96	99.48	0.24	0.96
73.39	0	0.002	1080.00	200.07	100.04	0.24	0.96
73.85	0	0.002	1090.00	201.19	100.59	0.25	0.96
74.31	0	0.002	1100.00	202.3	101.15	0.25	0.97
74.77	0	0.002	1100.00	203.42	101.71	0.25	0.97
75.22	0	0.002	1110.00	204.53	102.27	0.25	0.97
75.68	0	0.002	1120.00	205.65	102.82	0.25	0.98
76.14	0	0.002	1120.00	206.76	103.38	0.25	0.98
76.59	0	0.002	1130.00	207.88	103.94	0.25	0.98
77.05	0	0.002	1140.00	208.99	104.5	0.25	0.98
77.51	0	0.002	1140.00	210.1	105.05	0.25	0.99
77.97	0	0.002	1150.00	211.22	105.61	0.25	0.99
78.42	0	0.002	1160.00	212.33	106.16	0.25	0.99
78.88	0	0.002	1160.00	213.44	106.72	0.25	1
79.34	0	0.002	1170.00	214.55	107.28	0.25	1
79.79	0	0.002	1180.00	215.66	107.83	0.25	1
80.25	0	0.002	1180.00	216.77	108.39	0.25	1
80.71	0	0.002	1190.00	217.88	108.94	0.25	1.01
81.17	0	0.002	1200.00	219	109.5	0.26	1.01
81.62	0	0.002	1200.00	220.1	110.05	0.26	1.01
82.08	0	0.002	1210.00	221.21	110.61	0.26	1.01
82.54	0	0.002	1220.00	222.32	111.16	0.26	1.02
82.99	0	0.002	1220.00	223.43	111.72	0.26	1.02
83.45	0	0.002	1230.00	224.54	112.27	0.26	1.02
83.91	0	0.002	1240.00	225.65	112.82	0.26	1.03
84.37	0	0.002	1240.00	226.76	113.38	0.26	1.03
84.82	0	0.002	1250.00	227.86	113.93	0.26	1.03
85.28	0	0.002	1260.00	228.97	114.49	0.26	1.03
85.74	0	0.002	1260.00	230.08	115.04	0.26	1.04
86.2	0	0.002	1270.00	231.19	115.59	0.26	1.04
86.65	0	0.002	1280.00	232.29	116.15	0.26	1.04
87.11	0	0.002	1280.00	233.4	116.7	0.26	1.04
87.57	0	0.002	1290.00	234.5	117.25	0.26	1.05
88.02	0	0.002	1300.00	235.61	117.8	0.26	1.05
88.48	0	0.002	1300.00	236.71	118.36	0.26	1.05
88.94	0	0.002	1310.00	237.82	118.91	0.27	1.05
89.4	0	0.002	1310.00	238.92	119.46	0.27	1.06
89.85	0	0.002	1320.00	240.03	120.01	0.27	1.06

Copyright 2013 by Fluid Dynamix. Company Confidential.

90.31	0	0.002	1330.00	241.13	120.57	0.27	1.06
90.77	0	0.002	1330.00	242.23	121.12	0.27	1.07
91.22	0	0.002	1340.00	243.34	121.67	0.27	1.07
91.68	0	0.002	1350.00	244.44	122.22	0.27	1.07
92.14	0	0.002	1350.00	245.54	122.77	0.27	1.07
92.6	0	0.002	1360.00	246.65	123.32	0.27	1.08
93.05	0	0.002	1370.00	247.75	123.87	0.27	1.08
93.51	0	0.002	1370.00	248.85	124.43	0.27	1.08
93.97	0	0.002	1380.00	249.95	124.98	0.27	1.08
94.42	0	0.002	1390.00	251.05	125.53	0.27	1.09
94.88	0	0.002	1390.00	252.15	126.08	0.27	1.09
95.34	0	0.002	1400.00	253.25	126.63	0.27	1.09
95.8	0	0.002	1410.00	254.36	127.18	0.27	1.09
96.25	0	0.002	1410.00	255.46	127.73	0.27	1.1
96.71	0	0.002	1420.00	256.56	128.28	0.27	1.1
97.17	0	0.002	1430.00	257.66	128.83	0.28	1.1
97.63	0	0.002	1430.00	258.75	129.38	0.28	1.1
98.08	0	0.002	1440.00	259.85	129.93	0.28	1.11
98.54	0	0.002	1450.00	260.95	130.48	0.28	1.11
99	0	0.002	1450.00	262.05	131.03	0.28	1.11
99.45	0	0.002	1460.00	263.15	131.58	0.28	1.11
99.91	0	0.002	1470.00	264.25	132.12	0.28	1.12
100.37	0	0.002	1470.00	265.35	132.67	0.28	1.12
100.83	0	0.002	1480.00	266.44	133.22	0.28	1.12
101.28	0	0.002	1490.00	267.54	133.77	0.28	1.12
101.74	0	0.002	1490.00	268.64	134.32	0.28	1.13
102.2	0	0.002	1500.00	269.74	134.87	0.28	1.13
102.65	0	0.002	1510.00	270.83	135.42	0.28	1.13
103.11	0	0.002	1510.00	271.93	135.96	0.28	1.13
103.57	0	0.002	1520.00	273.02	136.51	0.28	1.14
104.03	0	0.002	1530.00	274.12	137.06	0.28	1.14
104.48	0	0.002	1530.00	275.22	137.61	0.28	1.14
104.94	0	0.002	1540.00	276.31	138.16	0.28	1.14
105.4	0	0.002	1540.00	277.41	138.7	0.28	1.14
105.85	0	0.002	1550.00	278.5	139.25	0.29	1.15
106.31	0	0.002	1560.00	279.6	139.8	0.29	1.15
106.77	0	0.002	1560.00	280.69	140.35	0.29	1.15
107.23	0	0.002	1570.00	281.79	140.89	0.29	1.15
107.68	0	0.002	1580.00	282.88	141.44	0.29	1.16
108.14	0	0.002	1580.00	283.97	141.99	0.29	1.16
108.6	0	0.002	1590.00	285.07	142.53	0.29	1.16
109.06	0	0.002	1600.00	286.16	143.08	0.29	1.16
109.51	0	0.002	1600.00	287.25	143.63	0.29	1.17
109.97	0	0.002	1610.00	288.35	144.17	0.29	1.17
110.43	0	0.002	1620.00	289.44	144.72	0.29	1.17
110.88	0	0.002	1620.00	290.53	145.27	0.29	1.17
111.34	0	0.001	1630.00	291.63	145.81	0.29	1.18
111.8	0	0.001	1640.00	292.72	146.36	0.29	1.18
112.26	0	0.001	1640.00	293.81	146.9	0.29	1.18

Copyright 2013 by Fluid Dynamix. Company Confidential.

112.71	0	0.001	1650.00	294.9	147.45	0.29	1.18
113.17	0	0.001	1660.00	295.99	148	0.29	1.18
113.63	0	0.001	1660.00	297.08	148.54	0.29	1.19
114.08	0	0.001	1670.00	298.18	149.09	0.29	1.19
114.54	0	0.001	1680.00	299.27	149.63	0.29	1.19
115	0	0.001	1680.00	300.36	150.18	0.3	1.19
115.46	0	0.001	1690.00	301.45	150.72	0.3	1.2
115.91	0	0.001	1700.00	302.54	151.27	0.3	1.2
116.37	0	0.001	1700.00	303.63	151.81	0.3	1.2
116.83	0	0.001	1710.00	304.72	152.36	0.3	1.2
117.28	0	0.001	1720.00	305.81	152.9	0.3	1.21
117.74	0	0.001	1720.00	306.9	153.45	0.3	1.21
118.2	0	0.001	1730.00	307.99	153.99	0.3	1.21
118.66	0	0.001	1740.00	309.08	154.54	0.3	1.21
119.11	0	0.001	1740.00	310.16	155.08	0.3	1.21
119.57	0	0.001	1750.00	311.25	155.63	0.3	1.22
120.03	0	0.001	1750.00	312.34	156.17	0.3	1.22
120.49	0	0.001	1760.00	313.43	156.71	0.3	1.22
120.94	0	0.001	1770.00	314.52	157.26	0.3	1.22
121.4	0	0.001	1770.00	315.61	157.8	0.3	1.23
121.86	0	0.001	1780.00	316.69	158.35	0.3	1.23
122.31	0	0.001	1790.00	317.78	158.89	0.3	1.23
122.77	0	0.001	1790.00	318.87	159.43	0.3	1.23
123.23	0	0.001	1800.00	319.96	159.98	0.3	1.23
123.69	0	0.001	1810.00	321.04	160.52	0.3	1.24
124.14	0	0.001	1810.00	322.13	161.06	0.31	1.24
124.6	0	0.001	1820.00	323.22	161.61	0.31	1.24
125.06	0	0.001	1830.00	324.3	162.15	0.31	1.24
125.51	0	0.001	1830.00	325.39	162.69	0.31	1.25
125.97	0	0.001	1840.00	326.48	163.24	0.31	1.25
126.43	0	0.001	1850.00	327.56	163.78	0.31	1.25
126.89	0	0.001	1850.00	328.65	164.32	0.31	1.25
127.34	0	0.001	1860.00	329.73	164.87	0.31	1.25
127.8	0	0.001	1870.00	330.82	165.41	0.31	1.26
128.26	0	0.001	1870.00	331.9	165.95	0.31	1.26
128.71	0	0.001	1880.00	332.99	166.49	0.31	1.26
129.17	0	0.001	1890.00	334.07	167.04	0.31	1.26
129.63	0	0.001	1890.00	335.16	167.58	0.31	1.27
130.09	0	0.001	1900.00	336.24	168.12	0.31	1.27
130.54	0	0.001	1910.00	337.33	168.66	0.31	1.27
131	0	0.001	1910.00	338.41	169.21	0.31	1.27
131.46	0	0.001	1920.00	339.5	169.75	0.31	1.27
131.92	0	0.001	1930.00	340.58	170.29	0.31	1.28
132.37	0	0.001	1930.00	341.66	170.83	0.31	1.28
132.83	0	0.001	1940.00	342.75	171.37	0.31	1.28
133.29	0	0.001	1950.00	343.83	171.91	0.31	1.28
133.74	0	0.001	1950.00	344.91	172.46	0.32	1.28
134.2	0	0.001	1960.00	346	173	0.32	1.29
134.66	0	0.001	1960.00	347.08	173.54	0.32	1.29

Copyright 2013 by Fluid Dynamix. Company Confidential.

135.12	0	0.001	1970.00	348.16	174.08	0.32	1.29
135.57	0	0.001	1980.00	349.24	174.62	0.32	1.29
136.03	0	0.001	1980.00	350.33	175.16	0.32	1.29
136.49	0	0.001	1990.00	351.41	175.7	0.32	1.3
136.94	0	0.001	2000.00	352.49	176.25	0.32	1.3
137.4	0	0.001	2000.00	353.57	176.79	0.32	1.3
137.86	0	0.001	2010.00	354.65	177.33	0.32	1.3
138.32	0	0.001	2020.00	355.74	177.87	0.32	1.31
138.77	0	0.001	2020.00	356.82	178.41	0.32	1.31
139.23	0	0.001	2030.00	357.9	178.95	0.32	1.31
139.69	0	0.001	2040.00	358.98	179.49	0.32	1.31
140.14	0	0.001	2040.00	360.06	180.03	0.32	1.31
140.6	0	0.001	2050.00	361.14	180.57	0.32	1.32
141.06	0	0.001	2060.00	362.22	181.11	0.32	1.32
141.52	0	0.001	2060.00	363.3	181.65	0.32	1.32
141.97	0	0.001	2070.00	364.38	182.19	0.32	1.32
142.43	0	0.001	2080.00	365.46	182.73	0.32	1.32
142.89	0	0.001	2080.00	366.54	183.27	0.32	1.33
143.35	0	0.001	2090.00	367.62	183.81	0.32	1.33
143.8	0	0.001	2100.00	368.7	184.35	0.33	1.33
144.26	0	0.001	2100.00	369.78	184.89	0.33	1.33
144.72	0	0.001	2110.00	370.86	185.43	0.33	1.33
145.17	0	0.001	2120.00	371.94	185.97	0.33	1.34
145.63	0	0.001	2120.00	373.02	186.51	0.33	1.34
146.09	0	0.001	2130.00	374.1	187.05	0.33	1.34
146.55	0	0.001	2140.00	375.18	187.59	0.33	1.34
147	0	0.001	2140.00	376.26	188.13	0.33	1.34
147.46	0	0.001	2150.00	377.34	188.67	0.33	1.35
147.92	0	0.001	2160.00	378.42	189.21	0.33	1.35
148.37	0	0.001	2160.00	379.49	189.75	0.33	1.35
148.83	0	0.001	2170.00	380.57	190.29	0.33	1.35
149.29	0	0.001	2170.00	381.65	190.83	0.33	1.35
149.75	0	0.001	2180.00	382.73	191.36	0.33	1.36
150.2	0	0.001	2190.00	383.81	191.9	0.33	1.36
150.66	0	0.001	2190.00	384.88	192.44	0.33	1.36
151.12	0	0.001	2200.00	385.96	192.98	0.33	1.36
151.57	0	0.001	2210.00	387.04	193.52	0.33	1.36
152.03	0	0.001	2210.00	388.12	194.06	0.33	1.37
152.49	0	0.001	2220.00	389.19	194.6	0.33	1.37
152.95	0	0.001	2230.00	390.27	195.14	0.33	1.37
153.4	0	0.001	2230.00	391.35	195.67	0.33	1.37
153.86	0	0.001	2240.00	392.42	196.21	0.34	1.37
154.32	0	0.001	2250.00	393.5	196.75	0.34	1.38
154.78	0	0.001	2250.00	394.58	197.29	0.34	1.38
155.23	0	0.001	2260.00	395.65	197.83	0.34	1.38
155.69	0	0.001	2270.00	396.73	198.36	0.34	1.38
156.15	0	0.001	2270.00	397.81	198.9	0.34	1.38
156.6	0	0.001	2280.00	398.88	199.44	0.34	1.39
157.06	0	0.001	2290.00	399.96	199.98	0.34	1.39

Copyright 2013 by Fluid Dynamix. Company Confidential.

157.52	0	0.001	2290.00	401.03	200.52	0.34	1.39
157.98	0	0.001	2300.00	402.11	201.05	0.34	1.39
158.43	0	0.001	2310.00	403.18	201.59	0.34	1.39
158.89	0	0.001	2310.00	404.26	202.13	0.34	1.4
159.35	0	0.001	2320.00	405.33	202.67	0.34	1.4
159.8	0	0.001	2330.00	406.41	203.2	0.34	1.4

EXC. TEMP. (DEG. C)	AREA (SQ. M)
0.01	1.9100
0.02	0.4920
0.03	0.2050
0.04	0.1090
0.05	0.0671
0.06	0.0439
0.08	0.0307
0.09	0.0221
0.1	0.0159
0.11	0.0120
0.12	0.0092
0.13	0.0069
0.14	0.0054
0.15	0.0042
0.16	0.0032
0.17	0.0024
0.18	0.0019
0.19	0.0015
0.2	0.0012
0.22	0.0009

Copyright 2013 by Fluid Dynamix. Company Confidential.

APPENDIX H: MODEL INPUT DATA - CEMENT UNIT**TABLE H.1****MODEL INPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
24-HOUR TIME SERIES DATA FOR THE EFFLUENT VOLUME DISCHARGED
CEMENT UNIT**

1.0 24 BBL/D TS SERIES.FLO

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

1115.0

TABLE H.2
**VISUAL PLUMES MODEL TEXT OUTPUT DATA FOR THE BURGER FIELD, OFFSHORE CHUKCHI SEA
CEMENT UNIT**
VISUAL PLUMES MODEL TEXT OUTPUT PDS FILE CONTENTS ARE LISTED BELOW:

PDSWIN	FLOATING	WARM	WATER	JETS	--				
AMBIENT	CONDITIONS	:	TEMP.	4	DEG.	C	VEL.	0.07	M/S
HEAT	CONVECTION	=	1						
DISCHARGE	CONDITIONS	:	TEMP.	=	12	C;			
DEPTH	=	0.09	M.	;	WIDTH	=	0.09	M.	
ANGLE	0	DEG	;	DISCHARGE	RATE	=	0	CU-M/S	
DISCHARGE	DENSIMENTRIC	FROUDE	NO.	=	7.42				

X(M.)	Y(M.)	EX.TEMP (DEG. C)	TIME (SEC.)	Q/Q0 (DILU.)	QM/Q0	DEPTH (M.)	WIDTH (M.)
0.25	0	8.015	1.04	2	1	0.08	0.21
0.27	0	7.823	1.10	2.05	1.02	0.08	0.22
0.28	0	7.643	1.16	2.1	1.05	0.08	0.23
0.3	0	7.474	1.22	2.14	1.07	0.08	0.24
0.31	0	7.314	1.28	2.19	1.1	0.08	0.25
0.33	0	7.163	1.34	2.24	1.12	0.08	0.26
0.34	0	7.019	1.41	2.28	1.14	0.07	0.27
0.37	0	6.751	1.54	2.37	1.19	0.07	0.29
0.4	0	6.507	1.67	2.46	1.23	0.07	0.31
0.43	0	6.281	1.81	2.55	1.28	0.07	0.32
0.45	0	6.072	1.95	2.64	1.32	0.07	0.34
0.51	0	5.697	2.24	2.81	1.41	0.08	0.37
0.57	0	5.369	2.54	2.99	1.49	0.08	0.4
0.63	0	5.078	2.85	3.16	1.58	0.08	0.43
0.68	0	4.819	3.17	3.33	1.66	0.08	0.46
0.74	0	4.586	3.50	3.5	1.75	0.08	0.48
0.8	0	4.376	3.85	3.66	1.83	0.08	0.51
0.85	0	4.184	4.20	3.83	1.92	0.08	0.53
0.91	0	4.01	4.56	4	2	0.08	0.56
1.03	0	3.703	5.31	4.33	2.16	0.09	0.6
1.14	0	3.441	6.08	4.66	2.33	0.09	0.65
1.25	0	3.216	6.89	4.99	2.49	0.09	0.69
1.37	0	3.019	7.73	5.31	2.66	0.09	0.74

Copyright 2013 by Fluid Dynamix. Company Confidential.

1.6	0	2.692	9.47	5.96	2.98	0.1	0.82
1.83	0	2.43	11.30	6.6	3.3	0.1	0.89
2.06	0	2.216	13.20	7.24	3.62	0.1	0.97
2.28	0	2.037	15.20	7.87	3.94	0.11	1.04
2.51	0	1.885	17.30	8.51	4.25	0.11	1.11
2.74	0	1.754	19.40	9.15	4.57	0.11	1.17
3.2	0	1.539	23.70	10.43	5.21	0.12	1.3
3.66	0	1.37	28.30	11.71	5.86	0.13	1.42
4.11	0	1.234	33.00	13.01	6.51	0.13	1.53
4.57	0	1.121	37.80	14.33	7.16	0.14	1.64
5.03	0	1.026	42.80	15.66	7.83	0.15	1.75
5.48	0	0.945	47.90	17	8.5	0.15	1.85
5.94	0	0.875	53.00	18.36	9.18	0.16	1.95
6.4	0	0.814	58.30	19.73	9.87	0.16	2.04
6.86	0	0.76	63.60	21.12	10.56	0.17	2.14
7.31	0	0.713	68.90	22.53	11.26	0.17	2.23
7.77	0	0.671	74.40	23.94	11.97	0.18	2.32
8.23	0	0.633	79.90	25.37	12.68	0.18	2.4
8.68	0	0.599	85.40	26.81	13.4	0.19	2.49
9.14	0	0.568	91.00	28.26	14.13	0.19	2.57
9.6	0	0.54	96.70	29.72	14.86	0.19	2.65
10.06	0	0.515	102.00	31.19	15.59	0.2	2.73
10.51	0	0.492	108.00	32.66	16.33	0.2	2.81
10.97	0	0.47	114.00	34.15	17.08	0.21	2.89
11.43	0	0.45	120.00	35.65	17.83	0.21	2.96
11.88	0	0.432	125.00	37.16	18.58	0.22	3.04
12.34	0	0.415	131.00	38.67	19.34	0.22	3.11
12.8	0	0.399	137.00	40.2	20.1	0.22	3.18
13.26	0	0.385	143.00	41.73	20.86	0.23	3.25
13.71	0	0.371	149.00	43.27	21.63	0.23	3.32
14.17	0	0.358	155.00	44.81	22.41	0.23	3.39
14.63	0	0.346	161.00	46.36	23.18	0.24	3.46
15.09	0	0.335	167.00	47.92	23.96	0.24	3.53
15.54	0	0.324	173.00	49.49	24.75	0.25	3.6
16	0	0.314	179.00	51.06	25.53	0.25	3.66
16.46	0	0.305	185.00	52.64	26.32	0.25	3.73
16.91	0	0.296	191.00	54.23	27.12	0.26	3.79
17.37	0	0.288	197.00	55.82	27.91	0.26	3.86
17.83	0	0.28	203.00	57.42	28.71	0.26	3.92
18.29	0	0.272	209.00	59.02	29.51	0.27	3.99
18.74	0	0.265	215.00	60.63	30.32	0.27	4.05
19.2	0	0.258	221.00	62.25	31.12	0.27	4.11

Copyright 2013 by Fluid Dynamix. Company Confidential.

19.66	0	0.251	227.00	63.87	31.94	0.28	4.17
20.11	0	0.245	233.00	65.5	32.75	0.28	4.23
20.57	0	0.239	240.00	67.13	33.56	0.28	4.29
21.03	0	0.233	246.00	68.76	34.38	0.29	4.35
21.49	0	0.228	252.00	70.4	35.2	0.29	4.41
21.94	0	0.223	258.00	72.05	36.03	0.29	4.47
22.4	0	0.218	264.00	73.7	36.85	0.3	4.53
22.86	0	0.213	270.00	75.36	37.68	0.3	4.58
23.31	0	0.208	276.00	77.02	38.51	0.3	4.64
23.77	0	0.204	283.00	78.68	39.34	0.3	4.7
24.23	0	0.2	289.00	80.35	40.18	0.31	4.75
24.69	0	0.196	295.00	82.02	41.01	0.31	4.81
25.14	0	0.192	301.00	83.7	41.85	0.31	4.87
25.6	0	0.188	308.00	85.38	42.69	0.32	4.92
26.06	0	0.184	314.00	87.07	43.53	0.32	4.97
26.52	0	0.181	320.00	88.76	44.38	0.32	5.03
26.97	0	0.177	326.00	90.45	45.23	0.32	5.08
27.43	0	0.174	332.00	92.15	46.08	0.33	5.14
27.89	0	0.171	339.00	93.85	46.93	0.33	5.19
28.34	0	0.168	345.00	95.56	47.78	0.33	5.24
28.8	0	0.165	351.00	97.27	48.63	0.34	5.3
29.26	0	0.162	357.00	98.98	49.49	0.34	5.35
29.72	0	0.159	364.00	100.7	50.35	0.34	5.4
30.17	0	0.157	370.00	102.42	51.21	0.34	5.45
30.63	0	0.154	376.00	104.14	52.07	0.35	5.5
31.09	0	0.152	383.00	105.87	52.93	0.35	5.55
31.54	0	0.149	389.00	107.6	53.8	0.35	5.6
32	0	0.147	395.00	109.33	54.67	0.35	5.65
32.46	0	0.145	401.00	111.07	55.53	0.36	5.7
32.92	0	0.142	408.00	112.81	56.4	0.36	5.75
33.37	0	0.14	414.00	114.55	57.28	0.36	5.8
33.83	0	0.138	420.00	116.3	58.15	0.36	5.85
34.29	0	0.136	427.00	118.05	59.02	0.37	5.9
34.74	0	0.134	433.00	119.8	59.9	0.37	5.95
35.2	0	0.132	439.00	121.56	60.78	0.37	6
35.66	0	0.13	446.00	123.32	61.66	0.37	6.05
36.12	0	0.128	452.00	125.08	62.54	0.38	6.1
36.57	0	0.127	458.00	126.84	63.42	0.38	6.14
37.03	0	0.125	465.00	128.61	64.31	0.38	6.19
37.49	0	0.123	471.00	130.38	65.19	0.38	6.24
37.95	0	0.121	477.00	132.16	66.08	0.39	6.29
38.4	0	0.12	484.00	133.93	66.97	0.39	6.33

Copyright 2013 by Fluid Dynamix. Company Confidential.

38.86	0	0.118	490.00	135.71	67.86	0.39	6.38
39.32	0	0.117	496.00	137.49	68.75	0.39	6.43
39.77	0	0.115	503.00	139.28	69.64	0.4	6.47
40.23	0	0.114	509.00	141.07	70.53	0.4	6.52
40.69	0	0.112	515.00	142.86	71.43	0.4	6.56
41.15	0	0.111	522.00	144.65	72.32	0.4	6.61
41.6	0	0.11	528.00	146.44	73.22	0.41	6.66
42.06	0	0.108	534.00	148.24	74.12	0.41	6.7
42.52	0	0.107	541.00	150.04	75.02	0.41	6.75
42.97	0	0.106	547.00	151.84	75.92	0.41	6.79
43.43	0	0.104	554.00	153.65	76.82	0.41	6.84
43.89	0	0.103	560.00	155.46	77.73	0.42	6.88
44.35	0	0.102	566.00	157.27	78.63	0.42	6.92
44.8	0	0.101	573.00	159.08	79.54	0.42	6.97
45.26	0	0.1	579.00	160.89	80.45	0.42	7.01
45.72	0	0.099	585.00	162.71	81.36	0.43	7.06
46.17	0	0.098	592.00	164.53	82.27	0.43	7.1
46.63	0	0.096	598.00	166.35	83.18	0.43	7.14
47.09	0	0.095	605.00	168.18	84.09	0.43	7.19
47.55	0	0.094	611.00	170	85	0.43	7.23
48	0	0.093	617.00	171.83	85.92	0.44	7.27
48.46	0	0.092	624.00	173.66	86.83	0.44	7.32
48.92	0	0.091	630.00	175.49	87.75	0.44	7.36
49.38	0	0.09	636.00	177.33	88.67	0.44	7.4
49.83	0	0.09	643.00	179.17	89.58	0.44	7.44
50.29	0	0.089	649.00	181.01	90.5	0.45	7.49
50.75	0	0.088	656.00	182.85	91.42	0.45	7.53
51.2	0	0.087	662.00	184.69	92.35	0.45	7.57
51.66	0	0.086	668.00	186.54	93.27	0.45	7.61
52.12	0	0.085	675.00	188.39	94.19	0.45	7.65
52.58	0	0.084	681.00	190.24	95.12	0.46	7.69
53.03	0	0.084	688.00	192.09	96.04	0.46	7.74
53.49	0	0.083	694.00	193.94	96.97	0.46	7.78
53.95	0	0.082	700.00	195.8	97.9	0.46	7.82
54.4	0	0.081	707.00	197.66	98.83	0.46	7.86
54.86	0	0.08	713.00	199.52	99.76	0.47	7.9
55.32	0	0.08	720.00	201.38	100.69	0.47	7.94
55.78	0	0.079	726.00	203.24	101.62	0.47	7.98
56.23	0	0.078	733.00	205.11	102.55	0.47	8.02
56.69	0	0.078	739.00	206.97	103.49	0.47	8.06
57.15	0	0.077	745.00	208.84	104.42	0.48	8.1
57.6	0	0.076	752.00	210.72	105.36	0.48	8.14

Copyright 2013 by Fluid Dynamix. Company Confidential.

58.06	0	0.075	758.00	212.59	106.29	0.48	8.18
58.52	0	0.075	765.00	214.46	107.23	0.48	8.22
58.98	0	0.074	771.00	216.34	108.17	0.48	8.26
59.43	0	0.074	777.00	218.22	109.11	0.49	8.3
59.89	0	0.073	784.00	220.1	110.05	0.49	8.34
60.35	0	0.072	790.00	221.98	110.99	0.49	8.38
60.81	0	0.072	797.00	223.87	111.93	0.49	8.42
61.26	0	0.071	803.00	225.75	112.88	0.49	8.46
61.72	0	0.07	810.00	227.64	113.82	0.5	8.5
62.18	0	0.07	816.00	229.53	114.77	0.5	8.53
62.63	0	0.069	822.00	231.42	115.71	0.5	8.57
63.09	0	0.069	829.00	233.31	116.66	0.5	8.61
63.55	0	0.068	835.00	235.21	117.6	0.5	8.65
64.01	0	0.068	842.00	237.1	118.55	0.51	8.69
64.46	0	0.067	848.00	239	119.5	0.51	8.73
64.92	0	0.067	855.00	240.9	120.45	0.51	8.77
65.38	0	0.066	861.00	242.8	121.4	0.51	8.8
65.83	0	0.066	867.00	244.71	122.35	0.51	8.84
66.29	0	0.065	874.00	246.61	123.31	0.51	8.88
66.75	0	0.065	880.00	248.52	124.26	0.52	8.92
67.21	0	0.064	887.00	250.42	125.21	0.52	8.95
67.66	0	0.064	893.00	252.33	126.17	0.52	8.99
68.12	0	0.063	900.00	254.25	127.12	0.52	9.03
68.58	0	0.063	906.00	256.16	128.08	0.52	9.07
69.03	0	0.062	913.00	258.07	129.04	0.53	9.1
69.49	0	0.062	919.00	259.99	129.99	0.53	9.14
69.95	0	0.061	925.00	261.9	130.95	0.53	9.18
70.41	0	0.061	932.00	263.82	131.91	0.53	9.22
70.86	0	0.06	938.00	265.74	132.87	0.53	9.25
71.32	0	0.06	945.00	267.67	133.83	0.53	9.29
71.78	0	0.06	951.00	269.59	134.79	0.54	9.33
72.24	0	0.059	958.00	271.51	135.76	0.54	9.36
72.69	0	0.059	964.00	273.44	136.72	0.54	9.4
73.15	0	0.058	971.00	275.37	137.68	0.54	9.44
73.61	0	0.058	977.00	277.3	138.65	0.54	9.47
74.06	0	0.057	983.00	279.23	139.61	0.54	9.51
74.52	0	0.057	990.00	281.16	140.58	0.55	9.54
74.98	0	0.057	996.00	283.09	141.55	0.55	9.58
75.44	0	0.056	1000.00	285.03	142.51	0.55	9.62
75.89	0	0.056	1010.00	286.97	143.48	0.55	9.65
76.35	0	0.056	1020.00	288.9	144.45	0.55	9.69
76.81	0	0.055	1020.00	290.84	145.42	0.55	9.72

Copyright 2013 by Fluid Dynamix. Company Confidential.

77.26	0	0.055	1030.00	292.78	146.39	0.56	9.76
77.72	0	0.054	1040.00	294.73	147.36	0.56	9.8
78.18	0	0.054	1040.00	296.67	148.33	0.56	9.83
78.64	0	0.054	1050.00	298.61	149.31	0.56	9.87
79.09	0	0.053	1050.00	300.56	150.28	0.56	9.9
79.55	0	0.053	1060.00	302.51	151.25	0.56	9.94
80.01	0	0.053	1070.00	304.46	152.23	0.57	9.97
80.46	0	0.052	1070.00	306.41	153.2	0.57	10.01
80.92	0	0.052	1080.00	308.36	154.18	0.57	10.04
81.38	0	0.052	1090.00	310.31	155.16	0.57	10.08
81.84	0	0.051	1090.00	312.27	156.13	0.57	10.11
82.29	0	0.051	1100.00	314.22	157.11	0.57	10.15
82.75	0	0.051	1110.00	316.18	158.09	0.58	10.18
83.21	0	0.05	1110.00	318.14	159.07	0.58	10.22
83.67	0	0.05	1120.00	320.1	160.05	0.58	10.25
84.12	0	0.05	1130.00	322.06	161.03	0.58	10.29
84.58	0	0.05	1130.00	324.02	162.01	0.58	10.32
85.04	0	0.049	1140.00	325.99	162.99	0.58	10.35
85.49	0	0.049	1140.00	327.95	163.97	0.59	10.39
85.95	0	0.049	1150.00	329.92	164.96	0.59	10.42
86.41	0	0.048	1160.00	331.88	165.94	0.59	10.46
86.87	0	0.048	1160.00	333.85	166.93	0.59	10.49
87.32	0	0.048	1170.00	335.82	167.91	0.59	10.52
87.78	0	0.047	1180.00	337.79	168.9	0.59	10.56
88.24	0	0.047	1180.00	339.77	169.88	0.6	10.59
88.69	0	0.047	1190.00	341.74	170.87	0.6	10.63
89.15	0	0.047	1200.00	343.71	171.86	0.6	10.66
89.61	0	0.046	1200.00	345.69	172.85	0.6	10.69
90.07	0	0.046	1210.00	347.67	173.83	0.6	10.73
90.52	0	0.046	1220.00	349.65	174.82	0.6	10.76
90.98	0	0.046	1220.00	351.63	175.81	0.6	10.79
91.44	0	0.045	1230.00	353.61	176.8	0.61	10.83
91.89	0	0.045	1240.00	355.59	177.79	0.61	10.86
92.35	0	0.045	1240.00	357.57	178.79	0.61	10.89
92.81	0	0.045	1250.00	359.56	179.78	0.61	10.93
93.27	0	0.044	1250.00	361.54	180.77	0.61	10.96
93.72	0	0.044	1260.00	363.53	181.76	0.61	10.99
94.18	0	0.044	1270.00	365.52	182.76	0.62	11.03
94.64	0	0.044	1270.00	367.51	183.75	0.62	11.06
95.1	0	0.043	1280.00	369.5	184.75	0.62	11.09
95.55	0	0.043	1290.00	371.49	185.74	0.62	11.13
96.01	0	0.043	1290.00	373.48	186.74	0.62	11.16

Copyright 2013 by Fluid Dynamix. Company Confidential.

96.47	0	0.043	1300.00	375.47	187.74	0.62	11.19
96.92	0	0.042	1310.00	377.47	188.73	0.62	11.22
97.38	0	0.042	1310.00	379.47	189.73	0.63	11.26
97.84	0	0.042	1320.00	381.46	190.73	0.63	11.29
98.3	0	0.042	1330.00	383.46	191.73	0.63	11.32
98.75	0	0.042	1330.00	385.46	192.73	0.63	11.35
99.21	0	0.041	1340.00	387.46	193.73	0.63	11.39
99.67	0	0.041	1350.00	389.46	194.73	0.63	11.42
100.12	0	0.041	1350.00	391.46	195.73	0.64	11.45
100.58	0	0.041	1360.00	393.47	196.73	0.64	11.48
101.04	0	0.041	1360.00	395.47	197.74	0.64	11.51
101.5	0	0.04	1370.00	397.48	198.74	0.64	11.55
101.95	0	0.04	1380.00	399.49	199.74	0.64	11.58
102.41	0	0.04	1380.00	401.49	200.75	0.64	11.61

EXC. TEMP. (DEG. C)	AREA (SQ. M)
0.4	17.00
0.8	5.30
1.2	2.50
1.6	1.39
2	0.86
2.4	0.57
2.81	0.40
3.21	0.28
3.61	0.21
4.01	0.16
4.41	0.12
4.81	0.09
5.21	0.07
5.61	0.06
6.01	0.05
6.41	0.04
6.81	0.03
7.21	0.02
7.61	0.02
8.02	0.01

This is the last page of this document.

Copyright 2013 by Fluid Dynamix. Company Confidential.